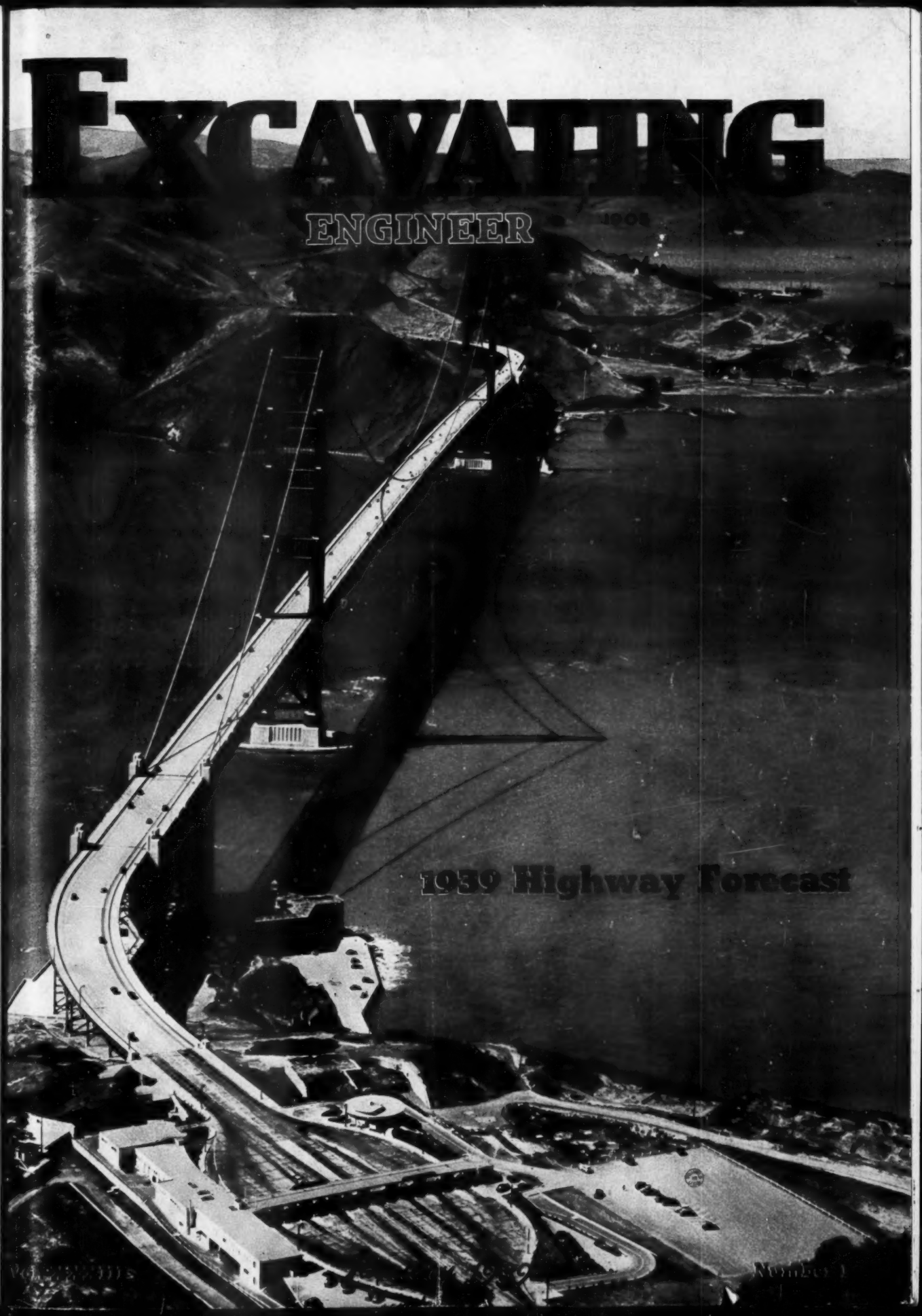
EXCAVATING ENGINEER



1939 Highway Forecast

BUCYRUS-ERIE

high-speed COAL LOADING

At the Binkley mine, Bevier, Mo., the Bucyrus-Erie 85-B backs the big output capacity of its special 5-yard coal-loading dipper with easy mobility and a high-speed digging cycle. Even in shallow digging, this fast-filling, free-dumping dipper delivers heaping loads. All digging motions are electrically controlled—acceleration and deceleration is fast—spotting is accurate. For increased production and lower costs, modernize your mining operations with Bucyrus-Erie's modern "years ahead" excavators.

BUCYRUS ERIE

BUCYRUS-ERIE CO., SOUTH MILWAUKEE, WIS., U. S. A.

Excavating, Drilling, and Material Handling Equipment

EXCAVATING ENGINEER

FOUNDED 1905

contents

Vol. XXXIII **January, 1939** No. 1

Golden Gate Bridge ..... **Front Cover**

Highway Forecast for 1939 ..... **12**

Alabama	14	Iowa	17	Nebraska	48	Rhode Island	55
Arizona	14	Kansas	17	Nevada	50	South Carolina	56
Arkansas	14	Kentucky	19	New Hampshire	50	South Dakota	56
California	14	Louisiana	19	New Jersey	50	Tennessee	56
Colorado	14	Maine	44	New Mexico	50	Texas	58
Connecticut	15	Maryland	44	New York	52	Utah	58
Delaware	15	Massachusetts	44	North Carolina	52	Vermont	59
Florida	15	Michigan	46	North Dakota	52	Virginia	59
Georgia	16	Minnesota	46	Ohio	54	Washington	60
Idaho	16	Mississippi	46	Oklahoma	54	West Virginia	60
Illinois	16	Missouri	48	Oregon	54	Wisconsin	61
Indiana	17	Montana	48	Pennsylvania	55	Wyoming	61

Modern Highways Replace Pack Trails Through Peru **20**

TracTracTors and Bucyrus-Erie Bullgraders play important part as new highways are built through rock and sand.

High Speed from Pittsburgh to Greensburg **26**

G. A. and F. M. Wagman use a wide variety of shovels for building super highway in Pennsylvania.

Editorial **30**

1939 Construction Estimate 30
Should Business Be Big Or Little? 31

Not In The Contract **32**

Equipment You Ought to Know About **34**

New Tire Designs .. 34	Bucyrus-Erie Snow Plow 36	R-B Power Fine-grader 36	Hand Lamps 37
Sheep's Foot Rollers 34	Stone Crusher 36	"99" Snow Plow ... 37	New Alemite Head. 37
Sterling Trucks ... 34			Simplex Jacks 37
			Snow Plow 37

Modern Equipment from Coast to Coast **38-39**

Shots from the Firing Line **40**

Modernization of Federal Aid System 40	Secondary Road Construction 41	A.R.B.A. Appointment 42
1937-38 Road Improvement 41	13.5 Per Cent Diversion in 1937 42	Mississippi A.G.C.A. Election 42
Employment on Road Work 41		30 Share Central Valley Work 43
		1939 Asphalt Meeting 43

Book Reviews **66**

Trade Notes **66**

LOOKING AHEAD

These interesting articles will appear in an early issue of EXCAVATING engineer. Watch for them.

County Road Work

Clay County, Missouri, finds 3½-yard scraper a handy all-around tool for road work.

Underground Salt Mining

Jefferson Island Salt Mining Company uses two ⅝-yard electric shovels for loading high grade salt 800 feet below the surface.

Published Monthly by THE EXCAVATING ENGINEER PUBLISHING COMPANY, South Milwaukee, Wisconsin, U.S.A.

F. O. WYSE, *Manager* — D. B. REED, JR., *Associate Editor*
ARNOLD ANDREWS, *Editor* — D. K. POWELSON, *Assistant Editor*
JOHN I. MORAVEC, *Art Director* — DELMAR COHEN, *Assistant Editor*
E. M. HEUSTON, *Advertising Manager* — H. J. MASUHR, JR., *Assistant Editor*

CCA Member Controlled Circulation Audit

Regular subscription: 25 cents per copy, $2.50 a year; Canada and foreign, subject to publication policy, $3.50 per year. Special subscription: Upon application on card inserted in this number this publication will be sent frequently (not regularly) free of charge, to companies, executives and supervisors engaged actively in the industry of excavation.

COPYRIGHT 1939 BY THE EXCAVATING ENGINEER PUBLISHING COMPANY

Speaking of Horsepower!

— by Ewing Galloway, N. Y.

Draft horses and Atlas Diesels have much in common. Both are built for heavy duty service at slow speeds. If given reasonable care, both will deliver dependable power, day in and day out, for a great many years.

A farmer would never choose a light weight, high spirited, temperamental animal and hitch him to a plow. A contractor who knows engines will not select a mechanical race horse for a job that requires an even tempered plug.

Contractors the world over feel that for their largest equipment, for the toughest jobs, Atlas Diesels are their idea of the type of power for shovels and draglines that have to do big things with certitude and economy.

ATLAS IMPERIAL DIESEL ENGINE CO.

Eastern Division
115 Broad Street
New York, N. Y.

Central Division
228 No. LaSalle St.
Chicago, Illinois

Western Division
1000 Nineteenth Ave.
Oakland, California

Gloucester - Baltimore - Providence - Philadelphia - Charleston - Miami - Jacksonville - Tarpon Springs - New Orleans
Fort Worth - Houston - El Paso - Terminal Island - Seattle - Portland - Vancouver - Ketchikan - Honolulu - Manila.

ATLAS IMPERIAL

For your convenience in writing to Atlas Imperial Diesel Engine Co., you will find a card bound in this issue.

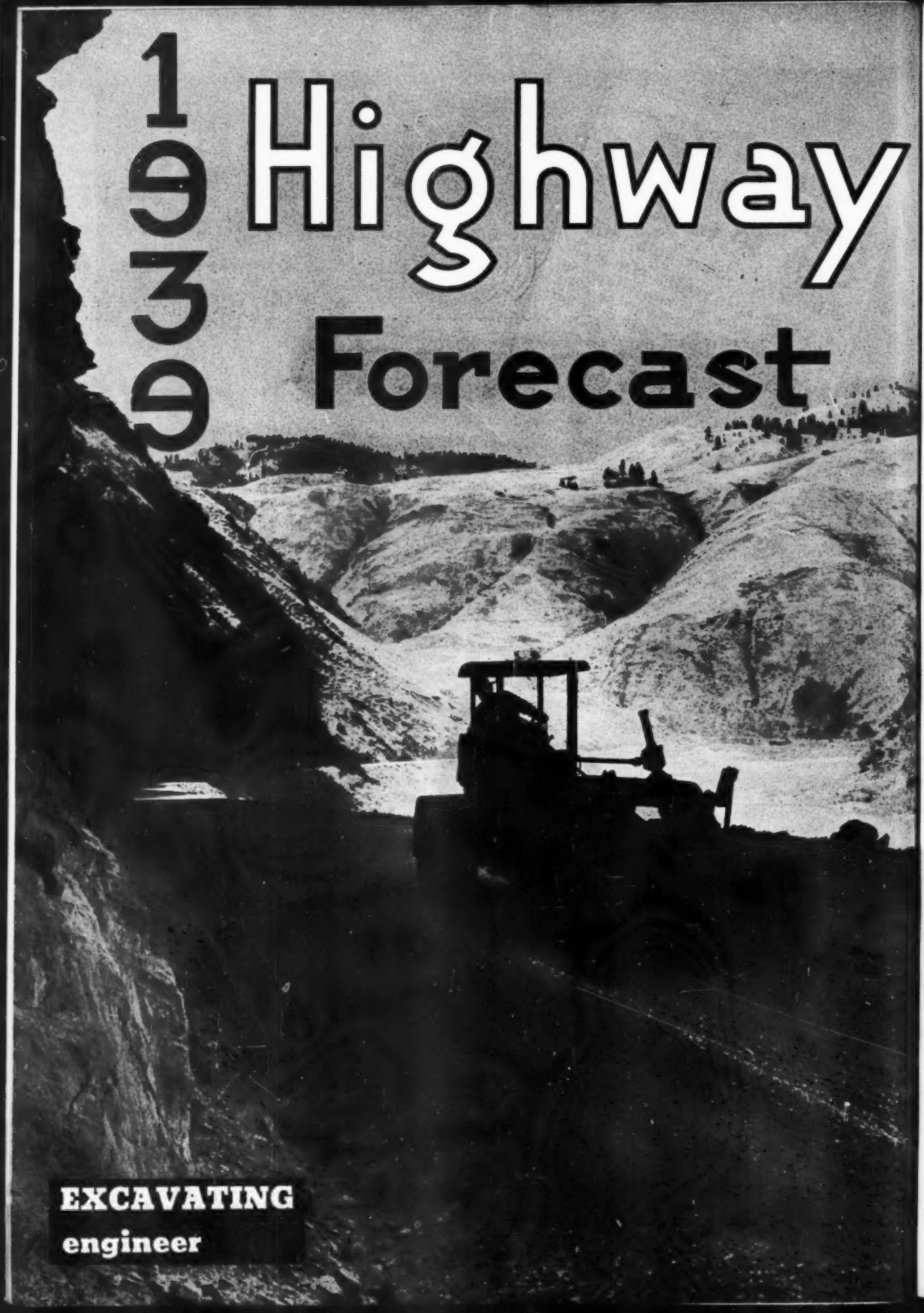
Reduce Preparation Costs 30 to 50%
with 27-T blast-hole drills
BUCYRUS-ARMSTRONG 27-T blast-hole drills are a real money-saver on the job. In many quarries and open-pit mines, use of these modern drills has actually lowered preparation costs as much as 30 to 50%. There are many reasons for this—faster drilling per day, greater footage per year, larger diameter holes for better fragmentation, less labor, easier moves, minimum operating and maintenance costs, and dependable drill performance.
Write for free 24-page bulletin
BUCYRUS ARMSTRONG
27-T

BUCYRUS - ERIE

SOUTH MILWAUKEE, WISCONSIN, U. S. A.

For your convenience in writing to Bucyrus-Erie Co., you will find a card bound in this issue.

1960 Highway Forecast



EXCAVATING
engineer

The Picture Changes

Exceptionally long, unusually low and streamlined almost to the extreme, with the beams of the bright overhead lights reflecting brilliantly from their polished bodies, they stood row on row. Merely looking at them you knew that beneath the sloping hoods of these 1939 automobiles, making their first public appearance at the automobile show, were engines that would flash them over the roads at 40-60-80 miles per hour without effort.

Gazing at the cars steadily another picture seemed to take shape in the background. An older picture scarcely visible to the human eye. A young man sits in a buggy pulled by a single horse. His only accelerator is the whip in the socket, his brake a lusty "whoa thar."

The picture changes. The same man, obviously a little older and looking more prosperous, sits in another buggy. A buggy that is moving without the aid of a horse. No, it isn't just coasting down a hill, it is moving under its own power. It is one of those new and very expensive horseless carriages, grandpappy of today's modern automobile.

Look, the picture changes again. A box with glass windows is coming down the street. There is a man in it guiding the hard rubber tired wheels in the direction he wants to go. The topless horseless carriage has become an automobile, the sedan is now a reality.

As the picture changes again and again the cars are reduced in height and possess greater speed. Trips of 40 miles or more change from a matter of days to hours and then to minutes.

The automobiles continue to multiply. Once considered a luxury even by the wealthier people they have become a necessity. They are now an important part of our life, serving us in business and pleasure alike.

There is romance in the history of the motor car and likewise is there romance in another field—a field whose advancement has been caused by the automobile. That field is the ever increasing web of highways being spun over the face of the world to accommodate these fast moving, easy riding conveyors of man.

It wasn't so long ago, after four or five wagons had been driven over the same course and left a deeply imprinted track that the track soon became known as a road. Buggies and wagons followed the same routes day after day jolting both wagons and drivers, but no thought was given to repairs until they became absolutely impassable. Even then it was easier to go around the bad spot, thus re-routing the road, than it was to make repairs.

Like the rapidly improving motor car, roads also showed steady advancement. Bumps were leveled, holes were filled in and conditions became gradually better.

The pick and shovel system, inadequate to fill all the needs, was replaced by horse drawn drag scrapers, wheeled and fresno scrapers, and eventually blade graders and elevating graders. Tractors, not as powerful as the ones we have now but still capable of displacing several horses, were soon on the job and motor or patrol graders took their place in the drive for better roads.

Shovels, pavers, finishers, rollers, bituminous distributors, etc., have all been invented or used extensively for improving the roads. All have played their part in building greater highways to meet the greater needs. All have been important in the active, romantic history of the highway as mud roads gave way to gravel, cinders, brick, oil mix, macadam and concrete.

Today, plain horse trails have grown to four lane highways with safety lanes down the center, bumpy, dangerous railroad crossings are being made into overpasses and underpasses, exceptionally busy highways bypass cities, highway underpasses and overpasses are replacing busy intersections and traffic lights regulate the flow of traffic.

The general prediction for 1939 is that highway expenditures will be approximately the same as they were in 1938. Federal Aid allotments have been reduced considerably but this will not necessarily reduce expenditures. In the past, most states have failed to match their share of the money distributed by the national government so by matching the total amount available many of them could show an increase in total expenditures.

At present 47 states in the United States have completed or are completing surveys upon which they will base their future highway programs. These surveys have been wholeheartedly supported by leading farm, industrial and business groups that realize the need of suitable highways for the movement of modern traffic with safety, economy and facility.

Because of the great burdens brought about by the depression, much of the highway fund in some states has been diverted for other purposes. Now, however, the realization of the importance of highways as useful state and national assets is bringing about laws against diversion. The people want roads where they are needed. They want adequate roads and they want safe roads—not only state and national highways but secondary or farm-to-market roads as well.

The recent state laws against diversion show the way the winds are blowing. The public is becoming more and more irritated by the vast amounts being diverted to other purposes. Motorists are taking up the fight to have the heavy taxes they pay as motor vehicle operators put to use in the proper manner—to construct and maintain roads. Therefore, we do not feel that we are falsely optimistic in looking forward a few years to when highways will receive their just due—when they will obtain all they deserve as a major convenience in business and pleasure alike.

Forecasts by States

Alabama

An approximate total of $10,822,000 will be spent on Alabama highways during 1939. Of this amount $8,372,000 is to be spent on construction, $2,000,000 for maintenance and $450,000 for miscellaneous purposes.

Construction funds will be used for the following according to Judge L. L. Herzberg, Associate Commissioner:

	Miles	Amount
Grading	66	$1,200,000
Paving (low type)	522	6,172,000
Bridges		1,000,000

Sources from which funds will be obtained are: Federal Aid $2,000,000; County Aid $1,400,000; State Gas Tax $5,000,000; Vehicle Licenses and other fees $2,422,000.

Arizona

Construction totalling $4,119,000, maintenance totalling $1,150,000 and miscellaneous expenditures amounting to $1,000,000 will bring the Arizona highway expenditures to $6,619,000 for 1939.

The above amount will be obtained from the following sources:

Federal Aid	$2,119,000
State Gas Tax	3,250,000
License Fees and other	1,250,000

Construction funds will be divided in the following way: 60 miles of grading $1,800,000; 130 miles of gravel or crushed stone surfacing and oil treatment $1,579,000; 8 miles of high type paving $240,000; bridges and grade separations $500,000.

No highway funds were diverted in Arizona during 1938.

Arkansas

During the 1938 calendar year, contract awards for road and bridge projects in Arkansas aggregated $5,524,443 and involved the following type of work:

Grading and minor drainage structures	215.7
Gravel surfacing	39.7
Base course and bituminous surfacing	234.9
Bituminous surfacing	249.6
Portland cement concrete pavement	40.6
Bridge structures, 4120 linear feet	
Railroad separation structures (number)	8

For the same period $3,020,544 was expended in the administration of the department and the maintenance of the state highway system and $8,655,307 for debt service consisting of interest on outstanding obligations and the retirement of maturities.

Construction funds available for the 1939 calendar year consist of regular Federal Aid in the amount of $1,698,000, secondary or farm-to-market road funds amounting to $254,000 and railroad-highway grade crossing separation and protection funds totaling $346,000. These funds are the Federal apportionments for the 1940 fiscal year beginning July 1, 1939, and require matching by the state except in the instance of grade crossing separation and protection funds.

The state is now making arrangements to absorb the regular Federal Aid through toll bridge reimbursement but a method of utilizing the secondary road fund has not yet been perfected. Small balances of previous apportionments of Federal funds will also be placed under award during the coming interim.

California

A fund of approximately $7,000,000 is still available and will be spent in California before June 30, 1939, the end of the present biennium. This fund is to be expended as follows:

36	major projects	$4,760,000
5	grade crossings	1,387,209
11	bridge reconstructions	451,000
	Miscellaneous day labor	228,600
	Contingencies	136,184
6	Federal feeders	402,040
	Total	$7,365,033

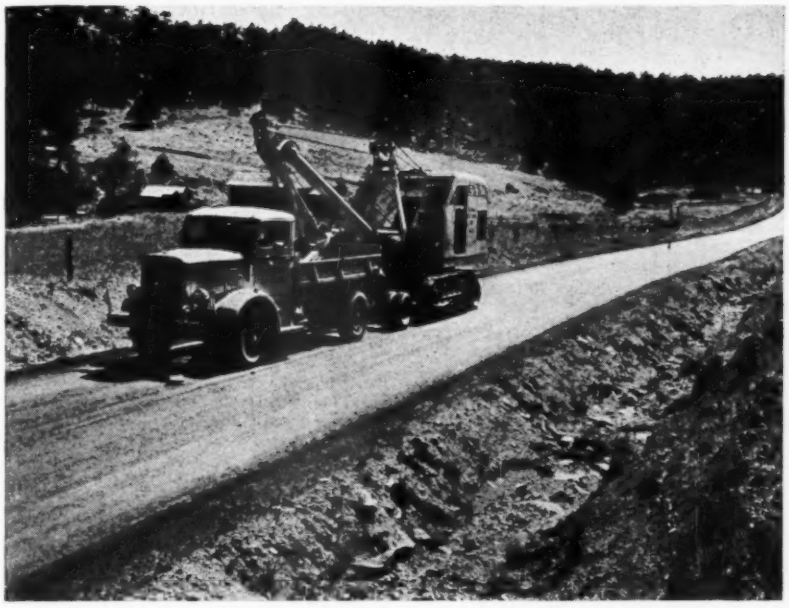
Figures for the next biennium beginning July 1, 1939, will not be available for several weeks.

Colorado

A total highway expenditure of $12,300,000 is planned in Colorado for 1939, according to figures released by M. W. Williams, Director of Publicity. This represents a decrease of 30 per cent from the 1938 program.

Construction will amount to $10,000,000; maintenance $1,500,000; and other costs, $800,000. These funds will be obtained as follows: Federal Aid, $3,500,000; other Federal funds $2,185,000; State gas tax, $5,000,000; and

• A 30-yard LeTourneau Tournapull moving dirt on a 6.3 mile highway project in the Santa Cruz Mountains between Los Gatos and Inspiration Point, California.



• FWD Model CUA 3 to 4-ton truck owned by the Colorado State Highway Department pulling a trencher shovel on a rubber tired trailer up an 8% grade near Shalffers Crossing, Colorado.

State vehicle license fees and other State sources, $1,615,000.

Construction funds will be divided into 250 miles of grading and gravel surfacing to cost $7,500,000; 500 miles of oil treatment amounting to $1,000,000, and 65 bridges and grade separations totaling $1,500,000. In addition, $1,250,000 in excavation awarded in 1938 or previously will be carried into 1939.

No highway funds were diverted in Colorado during 1938.

Connecticut

An increase of 46% is expected in the expenditures of the Connecticut State Highway Department which began its present fiscal year on July 1, 1938. According to C. G. Nichols, Executive Deputy Commissioner, this great increase is due to the fact that the expenditures during the fiscal year ending June 30, 1938, were somewhat under the general average, due to a variety of causes.

The total amount of money expected to be available for highways during this year is $27,000,000. Of this amount $18,125,000 is to be spent on construction; $5,425,000 will be used for maintenance and the remaining $3,450,000 will be used for other purposes.

Sources from which this money will be obtained are: Federal Aid $1,000,000; State Gas Tax $9,500,000; Vehicle license fees $15,000,000; available from other sources $1,500,000.

The recent flood and hurricane and other unusual conditions that have transpired since the start of the present fiscal year will undoubtedly make considerable difference in the current year's expenditures.

Delaware

A total of $2,750,000 will be available for highway use in the state of Delaware. Of this amount $1,500,000 will be used for construction, $1,000,000 will be spent for maintenance and $250,000 will be used for the Highway Police Patrol. The total figure given above is approximately 10% greater than that of 1938.

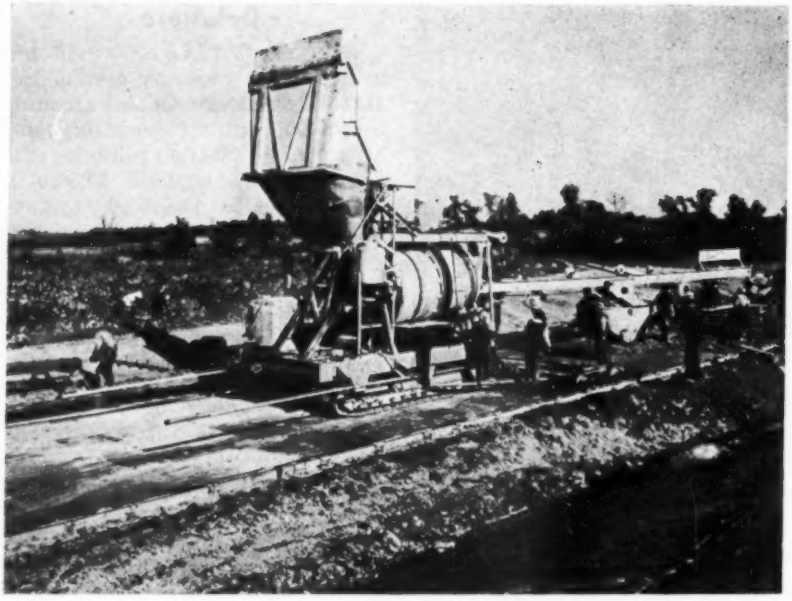
Highway funds will be obtained from the following sources in the approximate amounts shown: Federal Aid, $1,000,000; State Gas Tax, $2,000,000; Vehicle Licenses and other fees, $1,150,000.

The following figures, while they are not to be considered as final, give a good idea of how the construction funds are to be divided: 8 miles of grading at a cost of $125,000; 70 miles of gravel or crushed stone surfacing at $140,000; 250 miles of oil treatment at $100,000; 20 miles of high type paving at $650,000; 60 miles of low type paving at $360,000; and three bridges at $300,000.

Florida

Highway funds available in Florida for 1939 are expected to reach $12,959,300. Of this amount

• Clouson and Lawrence, contractors, made good use of the leaning frame feature of their Allis-Chalmers 112 Grader when cutting this high bank on the Gainesville-Dawsonville Road.



• Contractor Wm. F. Bowe of Augusta, Georgia, is the owner of this Ransome Dual Drum Paver shown in action on a highway job.

$9,072,300 will be used for construction; $3,300,000 for maintenance; and $587,000 for other purposes.

Money will be available from these sources: State Gas Tax, $9,750,000; Federal Aid, $2,219,000; and PWA, $990,300.

The Florida budget is not yet complete. A state fact finding survey relative to Florida's highway system is now nearing completion and the result will be reported at the forthcoming legislative session which opens April 1, at Tallahassee. The Legislative Committee on Highway Financing will also report to the legislature at that time.

Georgia

State Gas Tax, according to W. B. Bramley, State Highway Engineer, will furnish approximately 38% of the money to be spent on Georgia roads during 1939. The remainder of the $20,000,000 to be spent will be available from the following sources: Federal Aid 22%; Vehicle Licenses and other 10%; other sources 30%.

Of the total amount available for use on the roads, $17,500,000 will be used for construction and the remaining $2,500,000 for maintenance.

No decisions have been made to date as to how the construction funds are to be divided between the various types of construction.

No highway funds were diverted in Georgia during 1938.

Idaho

The total amount of money available for highways in Idaho during 1939 will be contingent on whether or not the next legislature passes the $5.00 Motor Vehicle License Fee and diverts one cent of the State Gasoline Tax to the counties.

Projects contracted for and completed in Idaho during 1938 were:

	Miles	Amount
Grade and drain	2.4	$ 75,542
Grade, drain & surface	37.8	501,228
Grade, drain, surface and road mix	10.5	134,620
Crushed rock surfacing	22.3	88,071
Road mix bit. surface	176.7	642,216
Plant mix bit. surface	23.2	133,502
Concrete pavement	4.9	162,009
Widening and crushed rock surfacing	17.9	177,961
Widen city street	.15	15,764
Seal coat bit. surface	33.2	19,175
Roadside improvement	1.1	12,228
Bridges and overheads		231,951
Total		$2,194,267

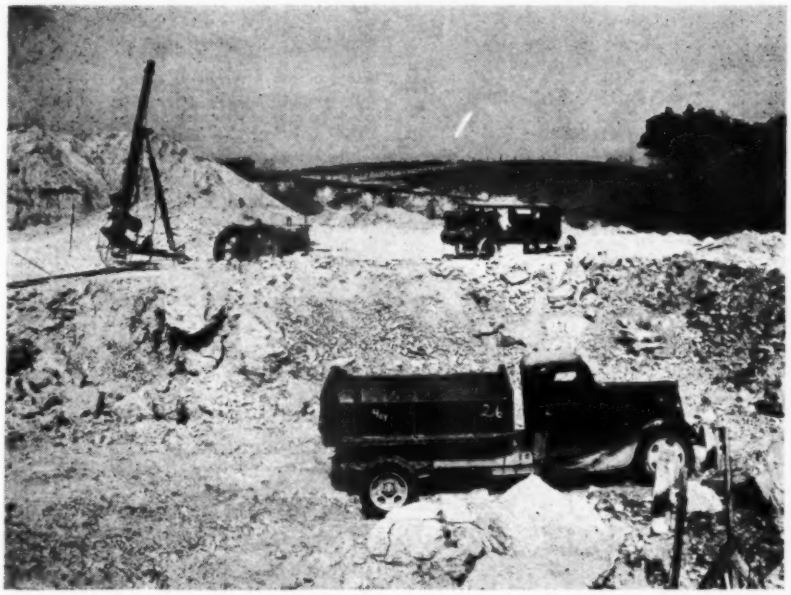
Illinois

The total amount of work to be carried over into 1939 and the 1939 work not yet awarded in Illinois consists of approximately 130 miles of high type pavement, 18 miles of bituminous surfacing on gravel or crushed stone base, 119 miles of gravel or crushed stone surfacing, 71 miles of grading, 43 bridges, 38 railroad grade separations and 7 highway grade separations. The money expended on this work will amount to approximately $18,000,000.

Besides the Federal allotment of $5,693,000 Illinois expects to have about $10,000,000 of State funds for construction available in 1939. This, in addition to the carry-over work will give a total construction fund of around $33,500,000 for the year.

It is not a certainty that this

• Salmon River Canyon near White Bird, Idaho, furnishes the scenic background for these Caterpillar Diesel Auto Patrols which are mixing oil and rock surfacing on U. S. Highway 95.



• This Chicago Pneumatic Tool Company 315 cubic foot capacity Portable Compressor and Wagon Drill are being used by Contractor Elmer Larson of Morrison, Illinois, to remove road stone from the quarry.

whole amount will be spent during 1939. In fact, it is reasonable to expect a carry-over of at least $5,000,000 at the end of the year.

Indiana

The State Highway Commission of Indiana reports an increase of 3% in 1939 highway funds as compared with those of 1938. The $18,775,000 available during 1939 will be divided three ways with $12,075,000 being used for construction, $4,500,000 for maintenance and the remaining $2,200,000 being put to other uses of a smaller nature.

Construction funds will be divided as follows:

Grading	$ 540,841
Roadside improvement	299,612
Paving (all types)	9,949,183
Bridges	1,285,364

State funds for 1939 will total $17,200,000 and an additional $3,149,000 is expected through Federal Aid.

Iowa

The total funds available for the Iowa State Highway Department from State Gas Tax, etc., will amount to about $17,750,000. An additional Federal Aid grant of $2,500,000 can be expected, thus making a total of $20,250,000. Out of this fund must come an interest charge of nearly eight million dollars on outstanding bonds.

Maintenance funds are expected to run approximately $4,500,000, leaving about $8,000,000 for construction of all types. At this time, there are no definite plans as to how this fund will be divided between paving, gravel surfacing, oil surfacing, etc.

• The Shirley Construction Company of Omaha, Nebraska, owns this Austin-Western 12-yard Hydraulic Scraper shown working on a county road job 10 miles south of Dubuque, Iowa.

The new administration which will take office in January has pledged itself to a farm to market road program but details as to how it will be worked out will not be known until after the State Legislature meets.

Kansas

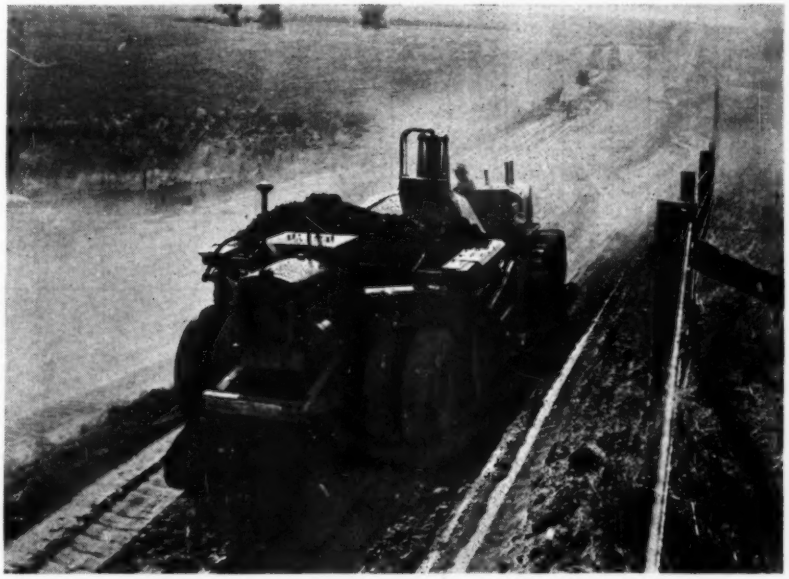
Highway expenditures in Kansas during 1939 will be approximately the same as they were during 1938. The total fund of $19,150,000 will be divided with $8,000,000 being used for construction, $5,250,000 for maintenance and $5,900,000 for miscellaneous purposes.

Construction funds will be used for the following projects:

263 miles of grading
116 miles of gravel or crushed stone surfacing
154 miles of stabilized base and armor coat
30 miles of high type paving
9 miles of asphalt surfacing
53 bridges
3 bank protection projects

Federal Aid Funds (including grade crossing, PWA, etc.) will supply $4,800,000 for use on Kansas roads. State Gas Tax will bring $9,745,000 and other sources, including the Vehicle License Fees, will add $4,600,000 to the total.

No highway funds were diverted in Kansas during 1938.



FEDERAL AID HIGHWAY PROJECTS
AS OF OCTOBER 31, 1938

STATE	COMPLETED DURING CURRENT FISCAL YEAR			UNDER CONSTRUCTION			APPROVED FOR CONSTRUCTION			BALANCE OF FUNDS AVAILABLE FOR PROGRAMMED PROJECTS
	Estimated Total Cost	Federal Aid	Miles	Estimated Total Cost	Federal Aid	Miles	Estimated Total Cost	Federal Aid	Miles	
Alabama	$ 2,474,871	$ 1,143,635	68.3	$ 8,577,587	$ 4,277,875	361.6	$ 2,027,554	$ 1,012,685	59.3	$ 2,317,246
Arizona	1,529,586	1,211,663	87.7	868,732	624,897	30.1	402,971	225,311	14.5	1,239,784
Arkansas	826,321	821,912	65.3	2,394,901	2,391,298	151.0	916,805	915,930	57.0	1,098,294
California	4,516,963	2,403,557	97.1	9,134,644	4,853,656	166.6	2,245,024	1,201,220	55.2	1,380,789
Colorado	1,884,301	1,026,742	68.0	3,189,623	1,769,547	103.2	620,310	220,710	18.2	1,707,876
Connecticut				1,373,618	672,300	14.7	244,930	120,990	2.0	1,525,005
Delaware	318,655	159,140	4.0	799,097	395,550	19.5	199,690	99,845	.1	1,186,556
Florida	518,900	259,450	16.9	3,787,138	1,893,569	79.7	468,000	234,000	.3	2,981,695
Georgia	3,345,960	1,661,822	170.2	5,646,414	2,823,207	266.4	676,280	338,140	42.7	5,483,199
Idaho	1,516,494	901,846	157.1	1,613,753	962,216	71.0	88,216	52,796	5.4	1,096,155
Illinois	4,454,334	2,243,843	147.3	10,688,711	5,343,049	222.1	1,917,690	958,845	60.8	2,284,235
Indiana	2,340,690	1,170,345	70.4	5,008,669	2,504,335	102.5	1,803,024	893,466	36.7	2,181,226
Iowa	3,488,075	1,616,819	115.9	7,394,006	3,339,683	238.3	1,153,768	542,300	39.8	152,947
Kansas	2,771,755	1,384,791	406.7	4,964,881	2,438,750	420.4	3,346,652	1,672,326	153.9	2,797,831
Kentucky	2,714,554	1,344,535	100.3	4,751,912	2,375,956	136.2	1,434,094	717,047	43.8	2,073,578
Louisiana	814,659	407,227	28.9	11,742,342	2,265,858	39.6	1,761,038	775,592	28.6	2,272,042
Maine	2,209,580	1,100,369	51.2	1,651,161	825,580	34.6	569,260	284,629	10.0	84,849
Maryland	520,000	260,000	8.6	2,097,767	1,047,121	34.9	1,270,781	611,730	19.2	1,670,916
Massachusetts	1,562,989	781,493	7.1	2,639,271	1,319,632	15.1	1,175,626	585,355	12.6	2,119,705
Michigan	5,269,093	2,541,884	107.5	5,259,583	2,627,237	140.2	1,049,490	521,390	20.1	1,480,614
Minnesota	1,649,382	769,274	67.0	7,675,990	3,815,033	387.7	1,443,896	721,043	75.7	1,837,387
Mississippi	1,641,308	779,312	63.0	8,421,212	3,144,207	379.6	2,676,160	1,077,870	101.6	2,024,656
Missouri	2,945,444	1,459,173	98.0	3,249,950	1,591,110	75.0	4,532,557	2,030,444	184.4	3,024,930
Montana	1,763,004	991,238	82.1	495,573	278,176	12.5	252,912	142,262	8.4	4,361,587
Nebraska	2,273,484	1,136,634	268.5	6,206,076	3,093,437	460.9	3,332,814	1,032,854	202.7	1,830,681
Nevada	1,210,686	1,048,938	163.1	791,087	679,651	21.9	217,950	189,001	5.0	1,176,650
New Hampshire	817,799	405,206	21.1	501,386	249,733	3.8	93,802	46,900	1.4	1,141,785
New Jersey	242,315	121,100	1.9	2,786,016	1,390,128	19.8	370,230	184,490	3.3	2,505,753
New Mexico	1,642,148	1,001,044	187.5	1,805,471	1,201,322	100.6	841,369	513,146	47.0	340,604
New York	5,628,509	2,757,475	123.6	13,839,330	6,846,742	223.8	4,717,370	2,174,495	73.2	1,494,619
North Carolina	4,610,957	2,186,400	180.3	5,554,799	2,771,532	322.1	1,446,660	702,530	88.3	784,819
North Dakota	2,039,728	1,928,527	173.6	1,739,781	1,530,474	138.0	83,622	44,787	7.4	3,568,606
Ohio	4,282,540	2,114,689	53.1	9,460,472	4,709,270	67.0	2,811,060	1,395,163	36.7	5,700,481
Oklahoma	3,580,717	1,390,953	150.4	4,464,673	2,323,247	138.2	1,172,660	622,764	38.9	2,601,051
Oregon	2,222,570	1,296,270	89.2	1,251,206	755,997	22.6	636,823	388,490	85.1	1,786,618
Pennsylvania	5,560,911	2,759,048	95.2	8,246,282	4,115,964	96.6	2,771,445	1,369,252	26.5	2,691,996
Rhode Island	559,790	279,895	7.7	978,112	489,056	12.2	73,900	36,950	.6	1,028,924
South Carolina	3,244,245	1,431,448	191.0	2,975,292	1,325,376	95.0	1,722,221	788,500	49.0	1,232,875
South Dakota	1,176,622	666,065	143.0	4,466,176	2,469,840	399.0	1,235,890	682,900	131.2	2,540,329
Tennessee	2,586,220	1,293,110	94.1	4,036,354	2,018,177	93.0	1,267,040	633,020	30.6	4,046,640
Texas	8,408,382	4,170,715	552.8	11,055,979	5,323,067	531.5	3,527,337	1,696,440	159.8	5,544,952
Utah	777,266	541,930	104.2	1,915,150	1,364,145	62.2	296,595	208,615	13.7	703,283
Vermont	1,010,022	459,608	28.4	881,090	415,883	23.4	309,470	154,545	5.4	158,292
Virginia	3,792,051	1,894,195	126.0	4,306,764	2,151,841	145.1	1,158,260	576,780	29.9	563,911
Washington	2,730,290	1,435,225	59.0	2,852,944	1,495,259	42.2	934,709	491,500	11.0	686,362
West Virginia	796,020	572,573	31.0	2,078,993	1,272,718	57.2	840,440	414,565	19.8	2,026,161
Wisconsin	3,204,269	1,554,071	96.5	7,171,759	3,350,450	210.5	472,173	217,400	19.0	1,458,413
Wyoming	1,845,727	1,136,088	213.8	844,002	515,981	92.8	343,970	212,540	51.0	517,704
District of Columbia	513,335	256,538	9.9	1,126,605	554,362	17.2	28,450	11,865	.3	1,202,411
Hawaii				1,128,739	562,390	20.5	63,720	31,660	4.2	640,325
Puerto Rico										
TOTALS	115,633,521	60,777,815	5,253.5	215,891,073	106,555,884	6,939.6	63,046,708	30,777,078	2,191.3	97,357,287

Kentucky

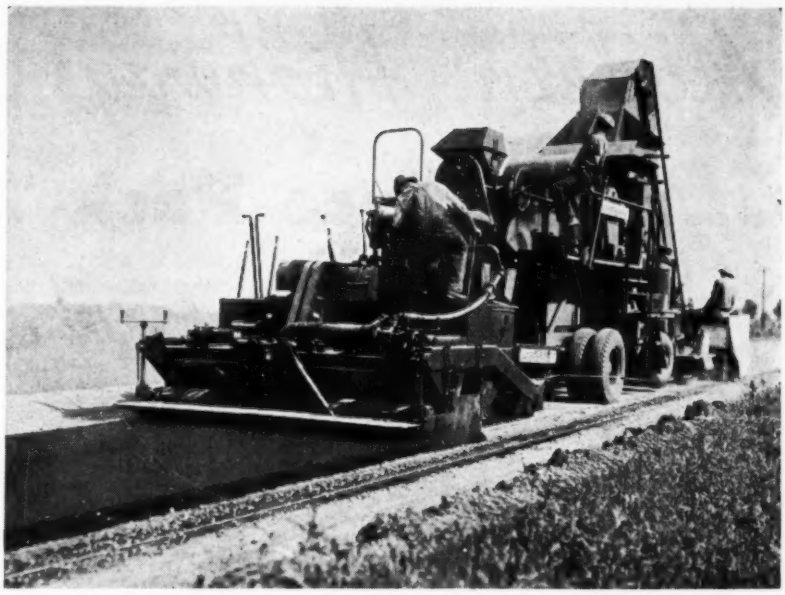
R. Y. Fishback, Engineer of Road Design, reports a slight increase over 1938 expenditures for the coming year. The State Gas Tax will furnish $12,500,000; Vehicle Licenses and other sources will bring $2,500,000; and Federal Aid will add $2,400,000 to give a total of $17,400,000 to be spent on Kentucky highways during 1939. Of this total $8,500,000 will be spent for construction; $4,500,000 on other work.

Construction funds will be divided in the following manner:

	Miles	Cost
Grading	100	$1,500,000
Surfacing—Gravel or Crushed Stone	125	1,200,000
Oil Treatment	300	2,000,000
Paving, high type	60	2,000,000
Paving, low type	75	1,300,000
Bridges (number)	50	500,000

In addition to the work covered above, approximately 500,000 yards of highway excavation awarded in 1938 or before will carry over into the 1939 program. The cost of this work will be $150,000.

No highway funds were diverted in Kentucky during 1938.



• A Barber-Greene Bituminous Travel Plant and Bituminous Finisher operate together on this Berenz & Son job near Bloomington, Illinois. The travel plant is discharging directly into the hopper of the finisher.

Louisiana

During 1938 there were under construction in Louisiana highway contracts amounting to $24,000,000 of which $8,000,000 represented new work started during the year. The remainder represented work carried over from 1937.

Funds necessary for specified new construction in 1939 amount to $10,739,000 and the work under construction which will be carried forward to 1939 is valued at $18,963,000.

The principal features of the 1939 program will be the completion of the superstructure and approaches of the Mississippi River Bridge at Baton Rouge; the completion of the airline highway between Shrewsbury and Canal Street in New Orleans; the construction of the embankment between Boutte and Mississippi River Bridge at New Orleans; the construction of numerous bridges and railroad grade separations; approximately one hundred miles of concrete pavement and approximately four hundred miles of secondary roads.

Work to be done in Louisiana during 1939 is as follows:

	Forward from 1938	New work 1939
Concrete	72 miles	116 miles
Surface treatment	24 miles	---
Gravel	281 miles	400 miles
Grading	78 miles	51 miles
Bridges	3	5
Grade separations	3	3
Roadside improvement	7 miles	8 miles

Total funds spent on this work, including the carry over jobs, will be as follows:

Concrete ---------- $ 8,062,000
Surface Treatment -- unknown

(Continued on page 44)

• Harry T. Campbell Sons Company of Towson, Maryland, are the owners of these units being used for finishing a road at Oberview, Pennsylvania. The rock cut consists of 182,000 yards, 281 feet at highest point and 500 feet long. Equipment shown includes a Caterpillar RD8, a LaPlant-Choate 18-yard wagon and a 2-yard Bucyrus-Erie shovel.

Modern Highways

Replace Pack Trails

Through Peru

Hand labor gives way to latest equipment as Peruvian Government replaces pack trails with modern roads and builds its section of the Pan-American Highway through territory once inhabited by the "People of the Sun."

By RALPH E. GORDON

DURING the early part of the sixteenth century, almost coincident with the arrival of the Spanish conquerors, the "Incas" or "People of the Sun," as they were also known, had reached the climax in the development of their civilization and culture. Guided by powerful sovereigns and using forced labor, large and important cities were raised and filled with imposing palaces, temples, monuments, and fortifications. These were served by a well planned system of roads with post houses at convenient intervals. Evidence of the engineering skill of these people is indicated by the size and construction of their edifices and roadways. These highways traversed high mountains and barren, desert-like pampas. They evidently centered at Cuzco, the Incaic capitol, from where they branched in four directions with coastal routes north and south; and like routes traversing the Andes mountains. These roads extended as far as Quitos and what is now Equador to the north, and what is now Bolivia and Chile to the south. Fragments of these routes are still visible today.

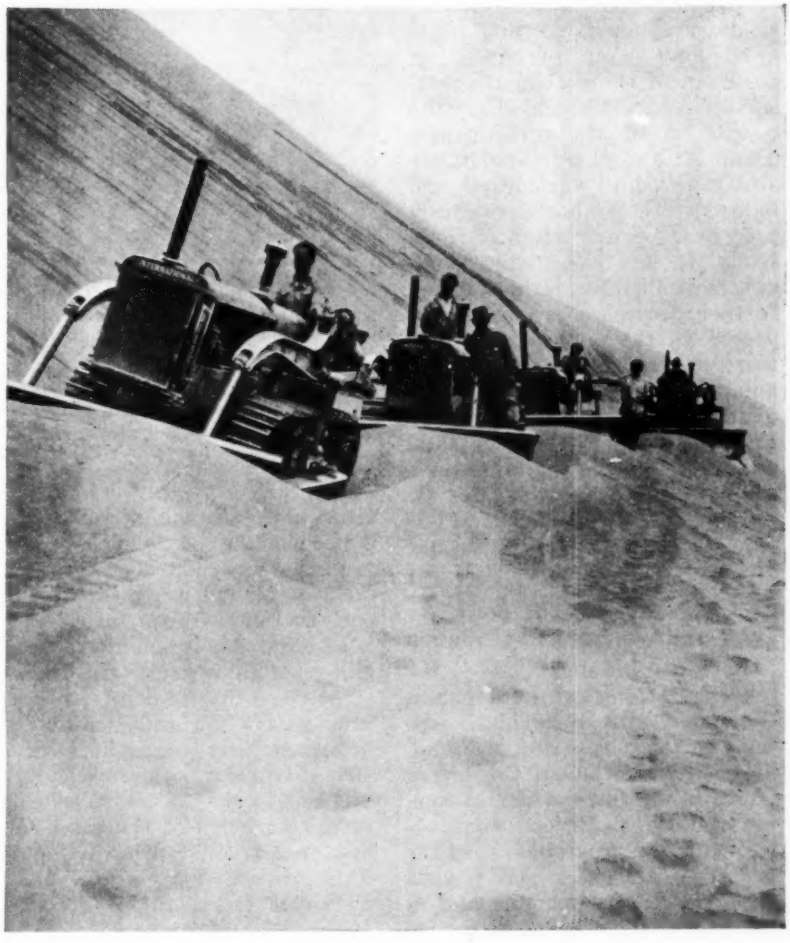
Shortest Distance Between Two Points

Evidently the Inca determined the route as needs required, following in the most part a direct line over mountains, rising straight to the summit, and descending in a like manner by means of steps, the outer edges of which were supported by stones usually found in abundance nearby. In flat or slightly rolling places the routes were lined on both sides by rows of stones closely placed in perfect alignment. As the Inca in his travels used pack animals almost exclusively, grades were of no importance.

Later the Peruvian Indian added his contribution in the form of bridges, in the construction of which he was an expert. Types varied from stone arch to suspension, both handmade from locally obtained material, and varied in length from a few feet to spans of considerable size.

The period of Spanish colonization, which lasted for over three centuries, ended road construction in Peru for some time as the country, to the Spaniard, was no more than a large mineral farm, products of which were of little weight yet of great value and could be very easily transported over existing roads by available pack animals. This desire for the maximum immediate profit no doubt caused them to pay little or no attention to the maintenance of the road system, and as a result many fell into disrepair and some disappeared altogether.

We shall now jump to 1916, as before that time most of the roads were simply cart roads and many no more than mere mule trails, travelled by the Incas and Indians since time immemorial. A survey at that time and a labor conscription law for certain males that followed in 1920 did their part in the building up of the roads system of the country and also impressed on the people and their government the great need for better and faster means of communication. Nothing very articulated, as is necessary in a national



• Native operators proudly pose with a fleet of tractor-bullgrader units which are doing in a few minutes work that formerly took many hours. Many of these operators never saw a tractor before being employed on this job.

highway system, had been accomplished until very recent years. Previous Peruvian administrations had stressed the importance of railroad construction as a preferred means of transportation in the country, although even today you cannot make a continuous trip for over a few hundred miles as most of the railroads serve widely separated sections of the country.

Taxes Increase Funds

Lack of funds has previously been the principle obstacle to continuous road construction in the Republic. Recently enacted laws taxing gasoline, motor fuels, oils, and Diesel engines are furnishing most of the necessary funds at the present time. In the last year and particularly during the past six months tremendous strides have been made in highway construction.

Recent purchases of modern roadbuilding equipment and the contemplated purchase of more as funds are available and need arises have taken the hard, slow labor out of the roadbuilding department and accelerated the completion of the present program. At the same time it has also released to agriculture and industry the labor previously used in the construction of these roads. It has also reduced the cost per mile of construction, and further decreases are to be expected as the operators become more proficient and the government begins using the products of its own oil wells in the north. Figures available give the total employed on the highway program during the first half of 1937 as about 8,000 to about 31,000 the second half, and the same amount for the first half of the year of 1938.

Three Year Public Works Program

Early in December, 1936, the present President of the Republic, General Oscar Benavides, outlined to the people in a radio address his now famous three year plan stating that the lack of communication facilities was obstructing the profitable use of the country's resources and wealth, the growth of commerce and of cities, and the development of agriculture. He pledged his government to a notable program of public works to be completed prior to December, 1939. This program includes among other things the construction of over 2044 kilometers (approximately 1271 miles) of new roads, the reconstruction of 5790 kilometers (approximately 3598 miles) of existing roads, and the asphalting of 1034 kilometers (approximately 642 miles) of the above. About 1000 kilometers of the total had been constructed prior to 1937. This program includes the completion of the Peruvian sections of the Pan-American highway called "Carretera Pan-Americana" in Peru, from the Equadorian border north of Tumbes along the coast southward to Nazca where it branches, one branch running to Chile and the other into Bolivia.

• A section of the Pan-American Highway showing a rock retaining wall for protection against flood waters. This wall was built entirely by hand. Bottom: This bridge, one of many on the Pan-American Highway through Peru, is made from railroad rails and surfaced with concrete slab flooring.

This highway is at present well on its way to completion, a good part is already asphalted, grades are in, and the roadway is ready for asphalt over a considerable distance more. Many of the thirty-two bridges on the coastal route are completed and the balance are under construction. There are, however, many gaps still to be constructed, but when finished you may ride over a highway sufficiently wide for two trucks or cars to pass safely and with grades of not over six per cent. The bridges you will pass over, most of which have been made in the United States, will be of all types and lengths, from approximately 10 meters (about 32

• Here Ralph E. Gordon holds on his knees two skulls unearthed by the excavating equipment. Thousands of human skeletons, several fully loaded canon shells and a buried railroad were uncovered during the excavation work.

feet) long at Topara to 452 meters (about 1483 feet) long at Pativilca, and will carry you across rivers and dry beds which also carry enormous quantities of water during the rainy season. The total distance of the Pan-American highway from the north at the Equadorian border to Lima, the capitol, is 1636 kilometers (1017 miles) while the distance to the junction where the route separates to Bolivia or Chile at Nazca is 2157 kilometers (1340 miles). The total distance from north to south by the coastal route to Chile is 3148 kilometers (approximately 1957 miles) while the same to the Bolivian border is 3126 kilometers.

Excavators Uncover Relics

Perhaps the most interesting chapters of South American history center in Peru so it is no wonder that the Pan-American Highway, constructed along the routes used by the Incas and Spaniards hundreds of years ago, should have a more or less romantic background. During the construction of a section of the new highway north of Lima a long buried railroad, several fully loaded cannon shells from a long forgotten war, and thousands of human skeletons, evidently there for hundreds of years, were uncovered by the excavators.

Listed below are some of the larger bridges, their approximate length, type, and river crossed on the coastal section of the Pan-American highway.

The list below does not include innumerable culverts and small bridges that were necessary for grade or drainage purposes and which are, in the most part, constructed as the road progresses.

Bearing in mind the country's great extent, its rough and mountainous nature, and the difficulty in building roads therein, it becomes obvious that it will be physically impossible to build all the roads needed for the com-

Location	River Spanned	Length Meters	Length Approx. Yards	Type of Construction
Tumbes	Tumbes	100	109	Steel Trestle
Sullana	Chira	300	328	Steel Trestle
Piura	Piura			Iron Arch
LaLeche	LaLeche	40	44	Steel Trestle
Sipan	Reque	40	44	Rigid Steel
Oliveres	Jequetepeque	180	197	Reinforced Concrete
Chicama	Chicama			
Moche	Moche	40	44	Rigid Steel
Viru	Viru			
Chao	Chao			Steel Trestle
Santa	Santa	200	218	Rigid Steel
Huambacho	Huambacho	30	33	Reinforced Concrete
Casma	Casma	60	66	Steel Trestle
Huarmey	Huarmey	30	33	Steel Trestle
Pativilca	Pativilca	452	494	Steel Trestle
Supe	Supe			
Huaura	Huaura	20	22	Rigid
Chancay	Chancay			Wooden Viaduct
Trapicho	Chillon	63	69	Reinforced Concrete
Balta	Rimac	98	107	Metal Arch
Luria	Luria	29	32	Steel Trestle
Mala	Mala	63	69	Rigid
Asia	Omas			Reinforced Concrete
Canete	Canete	171	187	Railroad Rails
Topara	Topara	10	11	Reinforced Concrete
Matagente	Chincha	206	225	Reinforced Concrete
Haumani	Pisco	135	148	Rigid Steel
Ica	Ica	25	27	Rigid Steel
Rio Grande	Grande	19	21	Reinforced Concrete
Rio Chico	Chico	202	220	Reinforced Concrete
Martinelli	Apurimac	50	54	Cable Suspension
Tablachaca	Apurimac	75	82	Reinforced Concrete

merce of Peru within the present three year program and the completion of an adequate highway system will actually take the continued work of several generations. However, present constructions will add over 8000 kilometers (4971 miles) to the highway system of the Republic. At the end of 1937 the Peruvian highway system was classified as follows:

	Kilometers	Approx. Miles
Unimproved Earth	3922	2437
Improved Earth	4700	2920
Crushed Stone	9177	5702
Water Bound Macadam	3533	2195
Cement-Concrete	94	58
Reinforced Concrete	24	15
Concrete-Asphalt	14	9
Macadam-Asphalt	377	234
TOTAL	21,841	13,570

It must be brought to your attention here that the Peruvian classification of improved and unimproved highway varies greatly from what the average person in the States is familiar with, and some roads in the country are merely paths and not always in passable condition.

Four Different Projects

The present construction program on highways can be divided into four projects. First, the road from Lima to Arequipa, the second largest city in the Republic, through Nazca which will also be the coastal route of the Pan-American highway. Second, the road from Lima to Oroya and then southward through Cuzco, the ancient Inca capitol, and eventually into the rich mining district near Marcapata. This road will be later extended to meet the Pan-American highway at Juilliaca which runs from there through Puno on Lake Titicaca to La Paz, Bolivia, the highest capitol in the world. Third, the road from Lima through Oroya, northward through Cerro de Pasco where there are extensive American mining holdings, and running eventually to a point on the lower Ucayali river at Pacalpa, a tributary of the Amazon. This gives Peru the benefit of an Atlantic port as the river is navigable to this point at all times of the year for vessels of not over 10-foot draft and approximately 2000-ton displacement. Fourth, the road from Lima northward, along the coast generally, which will also be the Pan-American highway from the north. It is planned when these four are completed, or nearly so, to start on the roads that will connect the interior with the four main roads. However, as some of these connecting roads are now necessary, they are being constructed in part at this time as will be detailed later.

Wide Variety of Equipment

Equipment at present being used in the construction of the road program includes the following:

Track Type Tractors	135
Road Graders	36
Road Rollers	40
Rotary Scrapers	12
Road Patrols	11
Rock Crushers	12
Mixers (All Sizes)	13
Road Pavers	5
Heaters	35
Air Compressors	6
Centrifugal Pumps	60
Rooters	10

The greater part of the excavating and levelling work is being done with tractors and bullgraders. With native operators, most of whom had never viewed a tractor before, these units are working uninterruptedly day after day in the dry windblown sand along the coast and in the rocky passes and canyons of the Andes Mountains. Highways, comparable to those found in the United States, are being hewn out of mountains of sand and rock with equal ease. It is not an uncommon sight to see large groups of interested officials and engineers watching and marvelling at the ease with which the tractor-bullgrader units perform in a few minutes tasks that had previously taken hundreds of laborers many hours.

Consideration must also be given the fact that only three years have elapsed since asphalt was first used in Peru for road purposes. Considerable time and money have been spent in the preliminary work of training the workers in the use and operation of the necessary machinery and equipment and the process of laying this type of pavement. This work is now progressing fairly well, although slowly, but the advantage of asphalt pavement has been favorably impressed on the Peruvian public. The asphalt used is of national production from the oil fields near Talara. The Peruvian government itself, through its Ministerio de Fomento, has also opened some good producing oil wells in the last few months, and it may be assumed that they may produce their own asphalt. This is merely a guess, however, as no such information has come from official sources.

• Part of the Pan-American Highway in the Lago Titicaca region. This road leads to La Paz, Bolivia.

Financing of the huge road program during 1937 was secured as follows:

	Approximately
Budget Appropriation (Gasoline Tax, etc.)	$1,500,000.00
Advanced by Industrial Concerns	540,000.00
From Tax for Unemployed (Social Security)	625,000.00
Discounting of Drafts	1,150,000.00
Loans from other Governmental Agencies	1,250,000.00
TOTAL	$5,065,000.00

(These figures are based on soles at 4.00 to $1.00)

The budget for 1938 includes $6,500,000.00 for highway construction, and probably will be expended in the most part for material and equipment that will build better roads more rapidly with less labor.

Automotive Industry Should Profit

A good market for automotive products should follow as a result of the opening of the mountainous districts which are very fertile, especially that of the Amazon valley which will be tapped by one of the roads in the program and with more to follow in the near future. About ten per cent of the 1937 appropriation was used in the purchase of road building equipment. This will be equalled and more probably raised for the next two years (1938 and 1939) and, as has been mentioned before, the scarcity of labor will force purchase of labor saving machinery if the program is to be completed. The replacement purchases too should be of considerable volume as some of the roads constructed to date have been very hard on equipment. This is especially true when you consider that this equipment was operated by men who had no previous experience. The parts replacement or service stock requirements will be of good volume, as is plainly evident for the same reasons.

Imports of machinery (all kinds) have been showing a steady increase in the last few years. Figures shown here indicate the amount of money spent during each year for modern equipment:

1930	$6,411,000.00
1931	3,433,000.00
1932	1,868,000.00
1933	3,633,000.00
1934	6,442,000.00
1935	9,786,000.00
1936	10,145,000.00
1937	11,881,000.00
1938 (First three months only)	3,873,000.00

Of the 1937 total the United States received $8,058,000.00, while Germany received $1,882,000.00 and Great Britain received $986,518.00, the balance going to Switzerland, France, Italy, and Sweden.

The automotive industry profited during 1937 by nearly four million dollars from exports to Peru, having shipped the following:

	Approximate Value
2,234 Automobiles	$1,773,000.00
2,431 Trucks	1,813,000.00
217 Busses	272,478.00

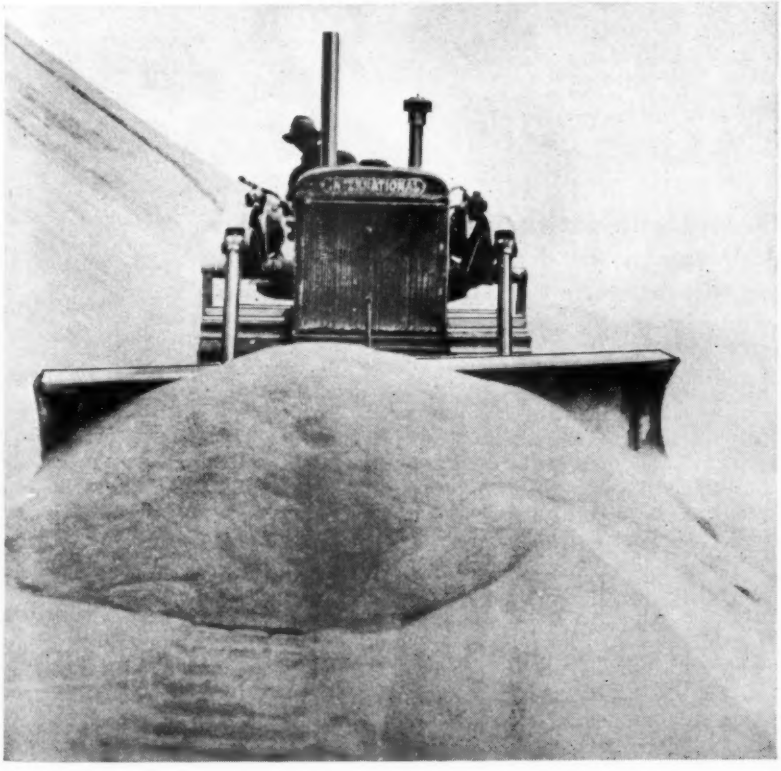
During 1937 Peru enjoyed economic prosperity; fiscal revenues were the highest ever collected in her history, staple export commodity prices were favorable and of increased quantity, shipping tonnage was greater, and bank deposits including savings accounts were larger. Credit was easy, and as Peru has no exchange control nor manipulated currency, fluctuations in the monetary unit (Sole) are slight and generally in direct relation to the United States dollar or the English pound sterling. Foreign exchange is dealt with freely in the open market.

Budget Surplus In 1937

The 1932 general budget was approximately $24,000,000.00 and the fiscal year closed with a deficit of approximately ten per cent, in contrast to which the year 1937 general budget was approximately $39,000,000.00 and the surplus revenues collected were in excess of $3,000,000.00. The prospects for 1939 are equally as good. Interest on internal debt has been paid in full punctually and some amortization was also made. A government agency has been set up in New York City to handle the external debt situa-

(*Continued on page 64*)

• An International TracTracTor and Bucyrus-Erie Bullgrader working in deep sand as the new highway progresses. These units were found exceedingly efficient in the heavy going.



High Speed from Pittsburgh to Greensburg

• Top: This is the kind of digging the 43-B has in the cut at Adamsburg. Bottom: The 43-B eases a "big one" into the waiting Euclid.

Motorists look forward with anticipation to the time when G. A. and F. M. Wagman will finish the 4-mile highway relocation job that will complete the 31-mile super Highway between Pittsburgh and Greensburg.

SIMPLEST directions to Irwin, Pennsylvania (pop. 3650) today are "East from Pittsburgh on U. S. 30 (The Lincoln Highway) until you come to the end of the four lane highway." But this is going to be out-of-date some time next June or July, for the "bottle neck" section of approximately four miles of U. S. 30 between Irwin, on the west, and Adamsburg, on the east, will be replaced by a modern four-lane high-speed highway which bypasses both communities. Motorists who use this highway frequently, now proudly eye the construction work rapidly going on, for they know only too well that the term "bottle neck" tells only a part of the story.

Irwin lies at the bottom of a valley with a steep climb to the west and a more gentle rise to the east; Adamsburg, also in a valley, is situated on both sides of a none-too-inviting "S" curve. Schools are located on the highway's edge in both communities and Irwin has a trolley line on U. S. 30 for most of the distance between the Borough limits. Several traffic lights and a crossing of the Youghiogheny Branch of the Pennsylvania Railroad also hinder traffic.

Relocation Definite Need

This ideal set-up for a highway relocation job has had the atten-

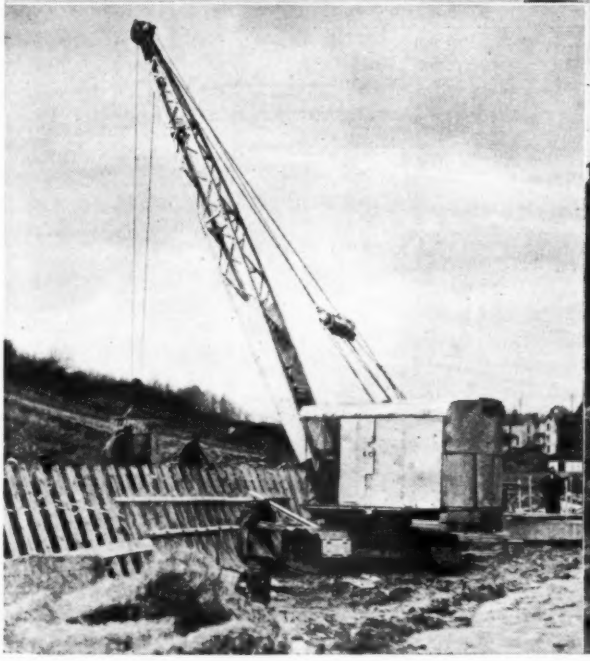
Upper left: Cat 30 and bulldozer working on the Irwin ramp behind the schoolhouse.

Upper right: An Allis-Chalmers Tractor and Baker Bulldozer level off the fill below the schoolhouse hill.

Center: Four 8-yard Euclids work under the 43-B Diesel shovel. Here is one coming out of the cut with a heaping load of rock.

Lower left: The Lorain 55, converted into a crane, places concrete in the arch below the schoolhouse hill.

Lower right: The batch plant from below. No needless handling of cement or aggregates here.



• Top: A view of the eastern end of the job. Bottom: The Lorain 75-A in the batch plant cut. At the right in the background the batch plant is being erected.

tion of the Pennsylvania Highway Commission for some length of time—witnessed by the fact that the four lane highway awaits only the completion of the Irwin-Adamsburg section to make a continuous, modern, high-speed road of the thirty-one mile stretch from Pittsburgh to Greensburg.

Bids were taken on this job August 12, and the low-bidders, G. A. and F. M. Wagman (of Dallastown, Pennsylvania) moved in on the job September 10, with as neat a representation of modern excavating equipment as one ever saw.

The 4-mile contract involves approximately 610,000 cubic yards of excavation of which about 60 per cent is rock and shale; two steel and concrete bridges of 520 feet and 100 feet in length; five concrete arches; and about 20,000 lineal feet of terra cotta drainage. Finishing will require some 90,000 cubic yards of concrete consisting of two 20-foot traffic lanes separated by a 6-foot safety island.

Six Large Cuts

Six of the ten cuts on the contract include over ninety per cent of the excavating under contract; the other four shallow cuts will average perhaps 13,000 cubic yards. For these the following digging equipment is being used: one Bucyrus-Erie 2-yard Diesel shovel, one Lorain 75 1¼-yard shovel, one Bucyrus-Erie 1¼-yard Gas plus Air shovel, one Lorain 55-A 1-yard combination shovel-crane, one P&H 1-yard crane, one Lorain 40 ¾-yard shovel, one Bucyrus-Erie 10-B ⅜-yard shovel, three Caterpillar RD8's with 12-yard LeTourneau scrapers, and one "L" Allis-Chalmers with a 12-yard Gar Wood scraper.

Fills are spread with five tractor-bulldozer units — two Allis-Chalmers "L" tractors with Baker bulldozers, two "30" Caterpillars with LaPlant-Choate bulldozers and one Cat RD7 with a LeTourneau bulldozer. All fills, because paving must go in next summer, are rolled carefully to prevent settling. For this, five 10-ton Huber and two 10-ton Buffalo-Springfield rollers are used.

No Borrow Needed

Very efficient planning of the work made possible the moving of 320,000 to 350,000 cubic yards (roughly fifty-five per cent of the total) in approximately two months or to November 14, at which time your cameraman-reporter visited the job. So well has the entire job been planned that all but about 50,000 cubic yards of excavation will be used as fill. No borrow will be needed.

The Adamsburg cuts of 72,000 and 121,000 cubic yards (see accompanying profile) are well along toward completion. In the latter cut C. H. (Charlie) Snyder, at the levers of the Buda-powered 43-B, was loading to four new Euclids with 8-yard bodies. About 50% of this cut was rock which had to be blasted. For this an Ingersoll-Rand wagon drill and I-R Model

• Fred M. Wagman drops in to look over the LeTourneau's. Walter Shaull keeps equipment and men hustling—lowering costs and increasing the number of jobs.

370 two-stage portable compressor worked ahead of the shovels. Other compressor equipment on various parts of the job included an Ingersoll-Rand 110 cubic foot and Gardner-Denver 210 and 110 cubic foot portable machines. Timken detachable bits were being used on all drills with very satisfactory results.

The cut at the extreme eastern end of the contract had been opened to bring down enough fill to the east of the 100 foot steel bridge to make good going for the Euclids which were used to carry the bulk of this fill from the larger cut. Later on the 43-B and perhaps some of the scrapers will finish up the 72,000 yard cut on the Adamsburg end.

Also in the cut with the 43-B was a Bucyrus-Erie GA-2 with John Harper at the levers. This Gas plus Air had taken the common off the top of the cut and was working on the west end of the 121,000 yard cut where the digging was not all rock. Trucks working under the GA-2 had only a short haul to bring up the grade of a side road.

The Lorain 75 (Jack Landis at the controls) was just finishing up the 100,000 yard "batch plant" cut in the center of the contract. This cut, so named because it lies just a few feet east of the ideal spot chosen for the batch plant, will be described later. Note particularly that the cuts in the center of the job were opened and completed first. Thus, when concrete is needed, trucks will be able to use the finished grade for the quickest possible round trip to batch plant and bridge or culvert.

• J. W. McMurray, grade foreman, on the batch plant cut and scraper foreman Fred Riggs, who has a perpetual smile and eyes that never miss a thing.

• Top: The Gas plus Air moved dirt—the last two words with emphasis, according to operator John Harper. This was taken in the west end of the Adamsburg cut. Bottom: The Allis-Chalmers Tractor and Gar Wood 12-yard scraper on the fill.

School House Cut Is the Largest

The largest cut of all, called the "Irwin" or "School House" cut, located partly within the Borough of Irwin, presents a neat bit of excavating. Demolition of several dwellings on the hill overlooking the Borough had already taken place and on the hill the LeTourneau and Gar Wood scrapers were taking big bites at regular intervals. The scrapers were dumping east of a concrete arch at the foot of the hill. Work on this arch was proceeding rapidly to take the fill to final grade. The tractors and scrapers came off the hill-top cut with their loads and down the hill at top speed, passing around the end of the unfinished arch on their way to the dump. The return journey meant negotiating the grade of at least 45°—causing an almost continuous roar of giant Diesel engines as tractors and scrapers took their turns climbing to the newly opened cut. Scraper Foreman Fred Riggs was kept busy on this job. With the scrapers yielding 5500 yards each eight hour shift, the three shifts were piling up the yardage. Here too, one could usually find Superintendent C. M. ("Red") Rogers, but he had his watchful eyes seemingly all over the job at one time.

(*Continued on page 62*)

EXCAVATING ENGINEER

POWERED 1905

A Monthly Publication
Devoted to the Excavating Industry

The Excavating Engineer Publishing Co.
South Milwaukee, Wisconsin

F. O. WYSE — *Manager*
D. B. REED, JR. — *Associate Editor*
ARNOLD ANDREWS — *Editor*
D. K. POWELSON — *Assistant Editor*
JOHN I. MORAVEC — *Art Director*
DELMAR COHEN — *Assistant Editor*
E. M. HEUSTON — *Advertising Manager*
H. J. MASUHR, JR. — *Assistant Editor*

1939 Construction Estimate

Construction contracts to be let in the 37 Eastern States during 1939 may reach a total of $3,500,000,000, according to estimates released by F. W. Dodge Corporation. This figure would compare with an estimated total of $3,200,000,000 for 1938, and an actual total of approximately $2,900,000,000 in 1937. None of these figures include repair and maintenance work. This national construction news organization points out that the total building and engineering volume recorded from January 1 through November 15 of this year reached a total of $2,635,000,000 compared with $2,599,000,000 in the corresponding period of 1937, and anticipated that considerable letting of public works contracts before the end of the year would materially increase the spread between the final 1938 and 1937 figures. For 1939, indications of increased volume in public and private residential building, commercial and factory building, and public utility construction are stated to be very good.

Reviewing such factors as the recent marked upturn after last year's recession, increased employment, the revival of business optimism after a period of excessive fears, and the widely held view that recent election results are favorable to business progress, Thomas S. Holden, vice president in charge of statistics and research in the Dodge organization, states: "All these favorable factors might conceivably lead to a sustained construction revival to continue without serious interruption for several years.

According to Holden's view, three potential factors might tend to curb recovery, if they should become actual in 1939. First, there is the question whether private building and engineering work will increase fast enough to offset the tapering off of P.W.A. projects now scheduled for the second half of next year. Second, concurrent rises next spring in public and private housing activity, public works projects, and new industrial developments stimulated by a defense program might bring about increases in construction costs so rapidly as to curtail private operations. The third factor is the possibility of international difficulties; a new war threat would upset all present calculations.

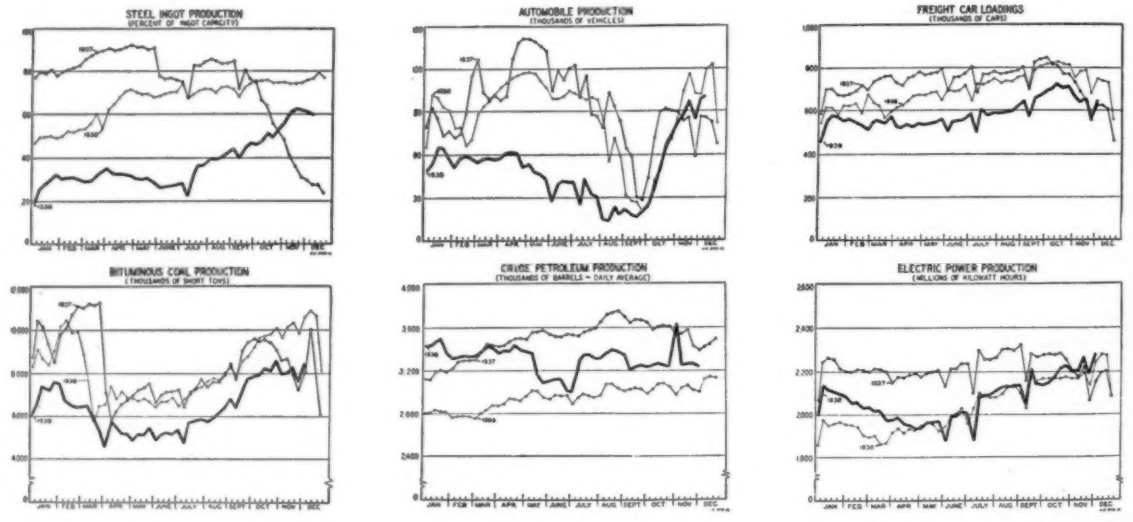
Reprints of "Should Business Be Big or Little?"

Reprints of the article on the following page are available for you. Just tell us how many you want and send us one cent for each copy. Excaváting Engineer is publishing 12 articles adapted from Bulletins issued by the S. D. Warren Company. "Should Business Be Big or Little?" is the sixth in the series.

You can get reprints of any individual article, or of the entire series. If you want, say, 25 copies of one article, tell us the name and send 25 cents. If you want 10 copies of each reprint in the series, send us $1.20. We'll send you copies of those already published, and follow with the others as they are issued. The price is one cent for each copy, and 10 copies of any one reprint is the smallest order we can handle.

These articles are being published because Excavating Engineer believes they give an extremely clear picture of the American Business System. The reprints are offered to you in case you care to distribute them to employees or friends. Orders for reprints should be addressed to Excavating Engineer, South Milwaukee, Wis.

WEEKLY BUSINESS INDICATORS



Should Business be Big or Little?

THERE are a hundred different answers to the question of how big business should be, but they all boil down to this . . . business should be as big as is necessary to do a good job.

One man who owns and operates a small shovel can dig basements, but big jobs like Grand Coulee Dam and the All-American Canal require companies large enough to handle all the necessary equipment.

Business is called upon to do all sorts of things. It must build rowboats and 15,000-ton battleships. It must make highly scientific devices which are correct down to millionths of inches, and it must build giant locomotives and great dredges.

The small crew of half a dozen workmen who built a house in your town could never build such a structure as the Empire State Building. Nor could the able craftsmen who build Gloucester fishing craft handle such a mammoth task as building the Queen Mary.

Business must be as big as it needs to be to do a good job. And some jobs have to be done by big businesses. If the telephone companies were all small companies, as they used to be, it would take hours to make a phone call over a 100-mile distance. If the automobile corporations were small companies, as they used to be, there would be no production lines for economical manufacture. Cars would be made slowly and would be so costly that you and I and our friends wouldn't be able to buy and own automobiles.

Henry Ford once was employed as a mechanic and was a good sort of fellow. When he pawned his watch to raise money to finish his first low priced automobile, he had become a small business man, but he was still a pretty good fellow. Now Henry Ford is one of the biggest business men in the world, but he's no better nor worse a fellow than he was when he was a mechanic.

Ford had an idea and worked on it. He set out to make an automobile that could be made and sold for a low price. In order to produce a low price car, it was necessary to develop mass production facilities that would permit manufacture at a low cost. The development of mass production facilities made the Ford business a big business. So now Henry Ford, the mechanic, is a big business man because his idea forced him into big business and made it possible for millions of Americans to own and drive automobiles.

As Ford built his business, he created opportunities for many thousands of other people to start businesses of their own and, indirectly, he created hundreds of thousands of jobs. In producing millions of automobiles, Ford supplied an influence that forced the construction of thousands of miles of good roads, that created the gasoline industry and the garage and gas station businesses, that created a demand for construction of thousands of business and residence buildings, that created orders for millions of tons of steel, wood, glass, cloth and many other products. The businesses and the jobs that resulted from the influence of twenty million Ford cars are so numerous that they can't be calculated.

American business has become big because America has grown too big to be served entirely by small business.

In 1870 America was relatively small and American business was relatively small. There were few roads and they were poor. Only a rich man could afford to own a horse and buggy. Manufactured goods were expensive in 1870 because they were made slowly by hand.

The population of the United States in 1870 was 38½ million, of which 32.4 per cent were employed in jobs. By 1930 the population had increased to 123 million, of which 39.8 per cent were employed in jobs.

Therefore the population in 1930 was about three times that of 1870, but there were four times as many people holding jobs.

Thus in the past sixty years business has made enough jobs to take care of the great increase in population and, in addition, has increased the proportion of jobs. In 1870, for every ten men, women and children there were three people holding jobs. In 1930, for every ten men, women and children there were four people holding jobs. Today there are 38 million more jobs than there were in 1870.

This increase in employment results from the fact that men like Henry Ford and companies like General Electric and United States Steel built big businesses to do the big things that needed to be done to serve this growing country.

In doing these big things, big businesses have created customers for smaller businesses. The development of automobiles, radios, packaged foods, ready-made clothes and thousands of other products has created a great need for machinery and other products that are made and sold by medium sized businesses. The wages paid by big and medium sized businesses have created customers for clothing stores, hardware stores, grocers, butchers and other small businesses. Big businesses, medium sized businesses and small businesses serve each other and are dependent on each other. Working together they provide America's 49 million jobs.

NOT in the *Contract*

Gene: "Has the depression hit you yet?"

Bill: "I'll say it has! First I lost my job and went back to the Old Man's to live: sent my children to the orphans' home: my wife went back to her mother, and I shot my dog."

Gene: "That's bad."

Bill: "Yes, sir: If times get any worse, I'm afraid I'll have to give up my car."

Mary, on her pair of skates,
Around the pond did frisk,
Now wasn't she a foolish girl
Her little * ?

The doctor was examining school children. One youngster was underweight.

"You don't drink milk?"

"Nope."

"Live on a farm and don't drink milk at all?"

"Nope, we ain't hardly got enough for the hogs."

Insurance Salesman: "Now that you're married and have tne responsibility of a wife, you will surely want to take out life insurance."

Bridegroom: "Insurance? Shucks, no. Why she's not the least bit dangerous!"

Author: This is the plot of my story. A midnight scene. Two burglars creep stealthily toward the house. They climb a wall and force open a window and enter the room; the clock strikes one.

Sweet Young Thing (breathlessly): Oh, which one?

Blue eyes gaze at mine—vexation.

Soft hand clasped in mine—palpitation.

Fair hair brushing mine—expectation.

Red lips close to mine—temptation.

Footsteps—damnation.

Do you mind if I stand here awhile and watch?

Pat: "Remember those two goils we had out last night?"

Mike: "Yes?"

Pat: "Well, the one I was with was a vision, but the one you was with was a sight."

Socialism means that if you have two cows, you give one to your neighbor. Under Communism you give both cows to the government, which gives you back some of the milk. Under Fascism you keep the cows but give the milk to the government, which gives you some of it back. And under New Dealism you shoot one cow, milk the other and then pour the milk down the sink.

"Painter, are you working?" she called for the third time, from the foot of the stairs.

"Yes, ma'am," the painter replied.

"I can't hear you working."

"Good night, ma'am," he exploded, "did you think I'd be putting it on with a hammer?"

Pauline—"I dreamed of you again, last night, big boy!"

Sam (ardently)—"Did I have any luck, baby?"

"George, you may bring me two fried eggs, some boiled Virginia ham, a pot of coffee, and some rolls," said a man to a waiter on a dining car, just after leaving Montreal.

"Yassa."

His companion said: "You may bring me the same, but eliminate the eggs."

"Yassa."

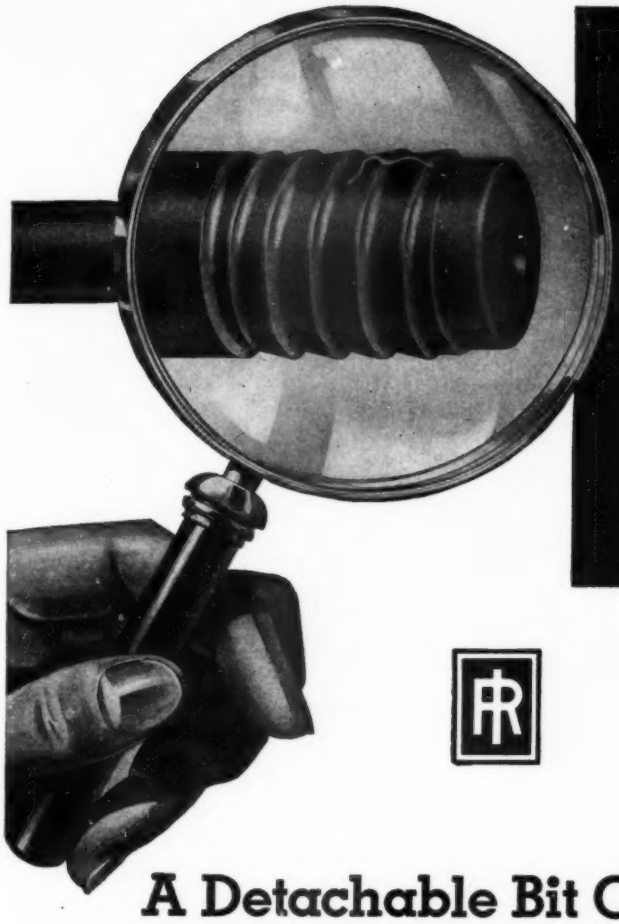
In a moment, the waiter came back.

" 'Scuse me, boss, but jes what did you all say erbout dem aigs?"

"I said just eliminate the eggs."

"Yassa." And he hurried away to the tiny kitchen.

In another moment he came back once more, leaned confidently and penitently over the table and said: "We had a bad accident just afo' we leave de Windsor Street Depot dis mornin', boss, and de liminator done got busted off, right at de handle. Will you take 'em fried same as dis hyar genman?"



It's the
THREAD DESIGN *that* MAKES JACKBITS OUTSTANDING

A Detachable Bit Can Be NO BETTER THAN ITS THREAD

Users of JACKBITS *know* that the design of the thread insures longer life and greatly improved performance. This patented thread keeps the bit tight without interfering with the ease of detachment and permits the bit to be easily put on or removed. Jackbits are always tight even after much use because the thread design automatically compensates for wear.

The strength of the Jackrod is maintained from top to bottom. There are no deep undercuts to cause failure. Because of the solid, broad seat between the Jackrod and Jackbit, the piston blow is transmitted squarely to the cutting edge through the full area of the rod. None of the blow is transmitted through the threads.

The threads on Jackrods can be easily forged in an Ingersoll-Rand Sharpener, or turned with either a power threading machine, a lathe or a hand threading tool.

Other Ingersoll-Rand Products Include: Rock Drills, Drill Steel Sharpeners, Portable and Stationary Compressors, Vacuum Pumps, Diesel Engines, Pumps, Scraper Hoists, Pneumatic Tools, etc.

Atlanta, Birmingham, Boston, Buffalo, Butte, Chicago, Cincinnati, Cleveland, Dallas, Denver, Detroit, Duluth, El Paso, Hartford, Houston, Kansas City, Knoxville, Los Angeles, Newark, New York, Philadelphia, Picher, Pittsburgh, Pottsville, Salt Lake City, San Francisco, Scranton, Seattle, St. Louis, Tulsa, Washington

Ingersoll-Rand

11 BROADWAY, NEW YORK CITY

69811

For your convenience in writing to Ingersoll-Rand, you will find a card bound in this issue.

Equipment you ought to KNOW ABOUT

New Tire Designs

The Goodyear Tire & Rubber Company at Akron, Ohio, announces the release of three new tire designs. Descriptions of these are as follows:

The new Hi-Rib tractor tire is specifically designed for use on tractor front wheels where greater ease of steering and resistance to side-slip is desired.

The new Studded Sure Grip tire,

equipped with a different type tread providing rugged studs set in angular bar arrangement to insure certain forward or backward traction when the going is difficult, is timed for introduction previous to the approaching season of mud, snow and slush. Designed for use by cars and trucks in off-the-road service, it is claimed the new tire's wider tread channels between the sturdy studs prevent packing and spinning when the car or truck is traveling in mud or snow.

The third tire is the new YKL truck tire, built of Rayotwist fabric like its predecessors, but including a special, new, ribbed-tread design for longer tread mileage. To provide cooler operation and to offer greater resistance to fatigue, the shoulder non-skid was made 20 to 30 per cent deeper than previously.

Sheep's Foot Rollers

R. G. LeTourneau, Inc., of Peoria, Illinois, have resumed the manufacture of Sheep's Foot Rollers by building an unusual Roller of advanced design. Drum sections 3½ feet in diameter and 5 feet long, are hinged together to allow oscillation and easy flexibility, thus permitting the Rollers to follow the contour of the most uneven ground and give uniform compaction at all points. Due to the hinging, any drum in the Roller may be interchanged with any other drum. This feature makes it easy to convert a two drum Roller into a four drum Roller and vice versa. Likewise, these sections can be placed in tandem where additional compaction is required.

The tamping feet are tapered; a special design that permits stronger base construction and makes it more difficult for the feet to become clogged, it is claimed. Because of the shape, they enter the new fill material easily, give maximum compaction, and pull out of the ground without kicking or tearing up the newly rolled material. These feet are 8 inches in length, and have a larger area welded to the drum, which adds to their structural strength.

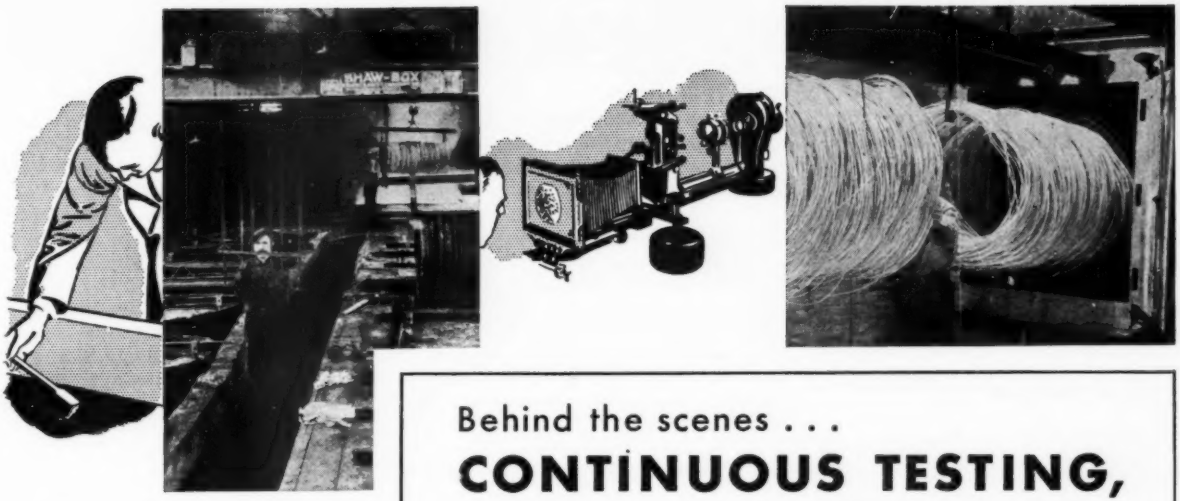
Sterling Trucks

Sterling announces a new line of models which embody two types of construction, the model numbers of which are distinguished by the letters "J" and "H."

The "J" construction embodies refinements and attractiveness which are usually desired by operators of transport trucks. Distinctive in appearance—yet incorporated in the radiator grills, fenders, hood, and cab are sturdiness and simplicity of design. The fenders are made of heavy gauge steel and are readily removable, providing maximum accessibility.

Since one type of truck is not best adapted to all types of hauling, Sterling developed the "H" type also. These models lend themselves exceptionally well to dump and off the highway operations. Sturdy in appearance and construction, they are also preferred by some transport operators be-

(Continued on page 36)

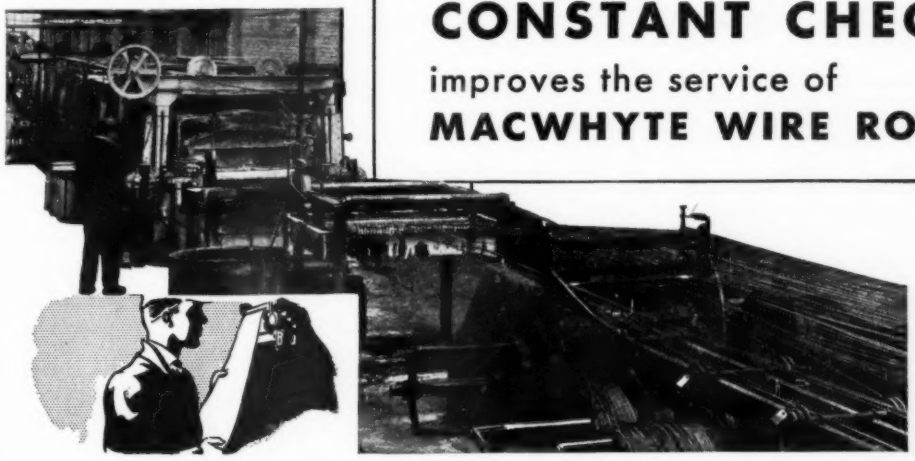


Behind the scenes . . .

CONTINUOUS TESTING, CONSTANT CHECKING

improves the service of

MACWHYTE WIRE ROPE



Mr. George Cudahy, Supt. of the Wire Mill, explains: "We work hand in hand with the laboratory. They help us and we help them. Together we make what we believe is the best wire you can find *anywhere*."

Remember . . . 'way back . . . when making wire rope was simply a matter of stranding several good lengths of wire?

Fortunately times have changed. Today making wire rope, as it's made at Macwhyte, is a scientific business.

Long Service Life built into Macwhyte rope

No matter what the operation . . . heat treating . . . pickling . . . wire drawing . . . at the Macwhyte mill metallurgists constantly check every step with the latest scientific equipment. Still later, Macwhyte engineers test and check the performance of the rope in the field.

This kind of supervision has proven time and again on the job, that longer service life and more economical operation *can* be built into wire rope.

Perhaps this is a reason why there are more users of Macwhyte PREformed and Regular Wire Rope today than ever before.

LOOK FOR THE *Whyte Strand*

MACWHYTE WHYTE STRAND IS BETTER BECAUSE IT'S MADE BY SPECIALISTS

MD. 379

MACWHYTE COMPANY, KENOSHA, WISCONSIN

Manufacturers of wire rope and braided wire rope slings. Distributors and stock throughout the U. S. A. for quick service.

MACWHYTE

Whyte Strand - PREformed

THE WIRE ROPE WITH THE INTERNAL LUBRICATION

For your convenience in writing to Macwhyte Company, you will find a card bound in this issue.

Equipment You Ought to Know About

(*Continued from page 34*)

cause of their simplicity and because the front axles are set back, resulting in shorter overall length.

Maximum accessibility of the engine is obtainable by easily removing the fenders which are made of heavy gauge steel. The hood is fitted with ventilating doors. A heavy-duty channel bumper is rigidly attached to the sidemembers and reduces materially the possibility of damage to the truck.

The gross ratings range from 18,000 to 80,000 pounds. A wide range of models is available with final drives of either bevel gear, double reduction, or chain drive. In addition to four wheel chassis, six wheel chassis of either the two or four rear wheel drive type are to be had. Diesel engines are furnished as standard in both four and six wheel chassis.

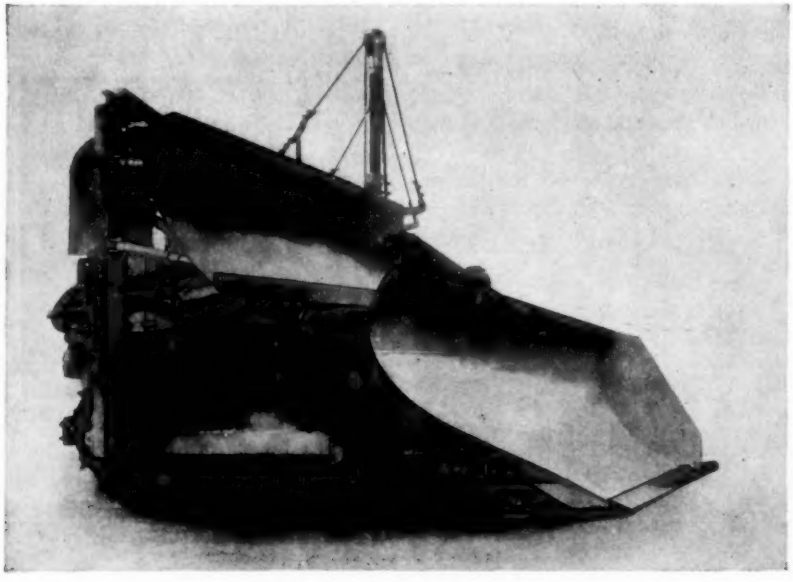
Bucyrus-Erie Snow Plow

Bucyrus-Erie announces the manufacture of equipment which converts the Bucyrus-Erie Bullgrader or Bulldozer to a Heavy-Duty Snow Plow by changing only the blade and frame.

The Snow Plow is a V-style with adjustable wings and full hydraulic control . . . heavy duty in every respect . . . capable of handling any snow . . . yet quickly convertible to a Bullgrader or Bulldozer for year 'round maintenance and earthmoving use. Snow Plow and Bullgrader or Bulldozer are mounted on the same T-40 International TracTracTor, use the same hydraulic pump, the same hydraulic cylinders, the same control valve and the same attaching parts.

Convertibility is simply had by removal of the bolts that hold the Bullgrader or Bulldozer frame and blade in place. Then disconnect lifting rods, back out, and run tractor into the Snow Plow frame, bolt the same connections and the plow is ready. The plow will fit either standard or wide gauge tractor with any width track shoe available.

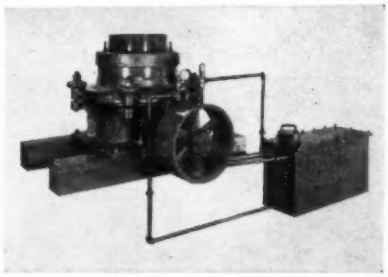
The hydraulically-controlled plow, mounted on an International T-40 or TD-40, is built to handle all snow depths. For light snows, speeds up to 6 m.p.h. are available, and by using both plow and wings at ground level, a path as wide as 18 ft. can be cleared. In slightly heavier snows or on wide roads one wing can be raised and used to wing snow back to the ditch while the opposite wing can be held at ground level for extra plowing width. The wings have ground clearance of 6 feet at full height . . . easily clear mail boxes, fence posts, etc. For heavy drifts, the plow, which clears a 9'0" strip, may be used without wing structure or wings, can be folded back or used for winging snow on either or both sides of the road. Adjustments of wing or plow heights are made instantly without leaving the cab.



The Bucyrus-Erie winter cab for the International T-40 and TD-40 is specially designed for snow removal work. Windows on all four sides insure full visibility and, because ventilation can be changed to meet varying wind directions, operator comfort is assured all the time.

Stone Crusher

The Telsmith Intercone Crusher, manufactured by the Smith Engineering Works of Milwaukee, Wisconsin, is their most recent development for the secondary and fine crushing field. It is a high-



speed reduction crusher, having a conical head which gyrates horizontally within an outwardly flaring curved concave bowl. Material crushed in the upper zone automatically spreads over a greater area as it moves downwardly, between crushing strokes, through the lower crushing zone to the discharge opening.

The main frame is an annealed steel casting, heavily walled and substantially ribbed. On the main frame is mounted an upper frame which encloses and supports the concave bowl. Special hollow cast iron "safety washers" protect the crusher against tramp iron.

R-B Power Finegrader

The R-B Equipment Manufacturing Company of Royal Oak, Michigan, has built a machine to efficiently prepare an almost perfect subgrade, rapidly and at low cost it is claimed. This machine, known as the R-B Power Finegrader, saves on concrete for the slabs are of uniform thickness because the action of the cutting knives leaves the surface of the subgrade hard and compact with a minimum of voids.

The Finegrader is adjustable to any cross section or crown. When the digging is excessively difficult the machine can be raised and lowered on the forms to complete the grade in two cuts. Coming in two

sizes, standard ten-foot and standard twenty-foot, the machines are furnished with large traveling wheels for easy mobility.

"99" Snow Plow

The Giant V Plow and the Rear-Mounted Snow wing, for use on the "99" Motor Grader, are new Austin-Western products. The V plow, with all-welded framework, uses the 4-wheel drive and steer advantages of the "99" to remove the deep snow at higher speed. The rear-mounted wing is an auxiliary unit for moving piled snow farther to the side, for clearing up after plowing, and also for handling a wide swath of light snow.

Hand Lamps

Two new electric hand lamps which are slated to provide greatly increased beam power and unequalled length of battery life have been announced by the Mine Safety Appliances Company.

These M. S. A. Special Hand Lamps, Models K and M2, combine the well-known Edison nickel-alkaline storage batteries with a special reflector head, developing in Model K a beam of 25,000 candlepower, and in Model M2, 12,000 candlepower.

New Alemite Head

A new, free-flow giant Alemite button head fitting, designed to speed-up the lubrication of heavy machinery, has been announced by the Stewart-Warner corporation. Bearings requiring large amounts of lubricant—such as those on tractor track rolls—can be lubricated in less time than with older types of fittings, and with less chance of damage to grease gun equipment through overloading, the manufacturer states.

In the new fittings, the usual valve core has been replaced with one which has a flat face and seat, and which, when open, offers practically no impediment to the free flow of lubricant. By expanding the diameter of the valve retaining-spring, lubricant flows unobstructed through the center of the spring and not through its compresed coils.

Simplex Jacks

Templeton, Kenly & Company, leading Screw and Lever Jack manufacturer, have announced a new line of Malleable Base Screw Jacks. The maker states that although the bases of malleable iron are tougher and less subject to breakage due to dropping or rough handling, the jacks are lighter in weight and a peep-hole in the malleable base enables one to see how far the screw can safely be run out. Additionally, the manufacturer claims that friction is reduced 88% because of the floating cap which rests on a chrome-molybdenum steel ball. This cap has a 9° float which completely centers the load.

Snow Plow

A V-type plow and a mast-type snow wing with a 12-foot blade have been designed by the Caterpillar Tractor Company for use on their Diesel No. 12 Auto Patrol. The six forward speeds of the motor grader adapt it to the varying conditions encountered in snow removal. The top speed in excess of 15 M.P.H. makes fast work of light snows, while the 4th speed of 6.8 M.P.H. provides maximum speeds for ordinary snow work.

Mr. Operator—

YOU'LL find new performance in GATKE 445 Moulded Brake Blocks. Developed for modern machines, higher speeds, severe operating conditions. Uniform operating efficiencies under extreme heats.

GATKE 445 Moulded is moulded in all shapes and sizes to fit every Shovel, Crane, Dredge or Drag Line. There are twenty-four years of experience behind this exceptional product.

GATKE 445 will lick your TOUGHEST job!

GATKE CORPORATION
228 N. La Salle St. Chicago, Ill.

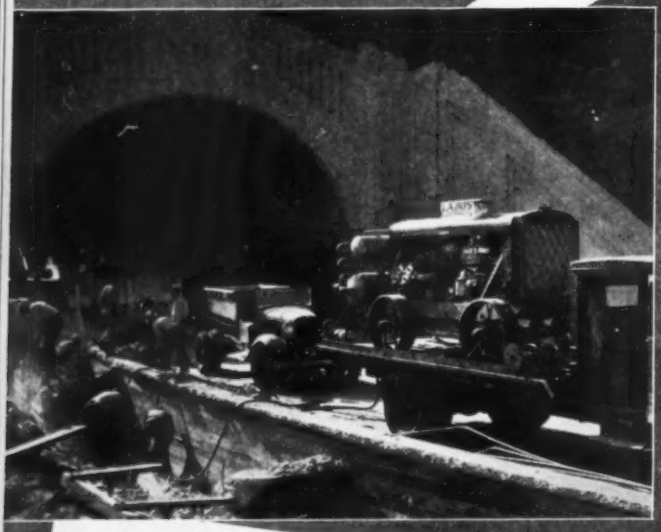
For your convenience in writing to Gatke Corporation, you will find a card bound in this issue.

Modern Highway Equipment

A Fruehauf 12 cubic foot Tandem Dump Trailer coupled to a White-Diesel tractor-truck spreading road materials in Midland County, Michigan.

Contractor John Oman, Jr., of Nashville, Tennessee, is the owner of this Adams Motor Grader being used on U. S. 241 between Phenix City and Opelika, Alabama.

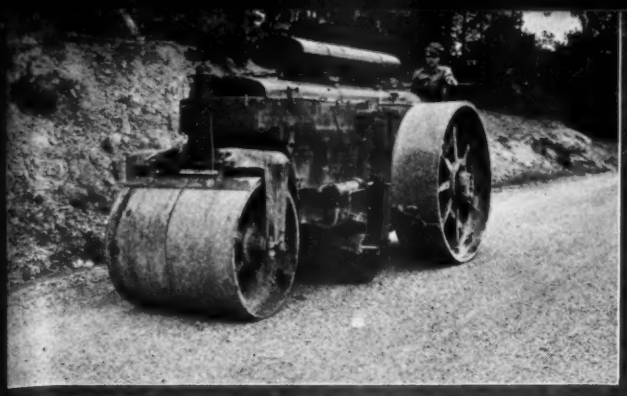
A Fate Root-Heath Silver King Tractor equipped with a Silver King Highway Mower is shown here cutting weeds at the side of a highway.



An Ingersoll-Rand Model 210 Portable Compressor operating paving breakers in conjunction with road improvements at the North Figueroa Street Tunnel in Los Angeles, Calif.

Below: A Rex Motor Mixer mounted on a Grico Two Axle Drive Ford truck. This unit is being used on a paving project in Virginia.

The Idaho State Department of Public Works owns this Iowa Tandem Crushing Plant located near Grangeville, Idaho.



An Austin-Western 10-ton Roll-A-Plane owned by the Arkansas State Highway Department is shown here rolling stabilized road near Malvern, Arkansas.

Goodrich Silvertown Tires are used on this motor grader working on a five mile road construction job. Pasco Construction Co. of Hurley, South Dakota is the owner.

n Use From Coast to Coast

his Case Tractor, equipped with oodyear Sure-Grip and Ribbed read Tires, is pulling a surface gra- er in Jasper County, Indiana.

This Caterpillar Diesel RD7 and Athey Wagon are being used to construct a dual highway between Fairfax and Falls Church, Va. W. W. Tuck & Son of Virgilina, Va. are the owners.

elow: This Novo Pavement Breaker being used to break the pavement nd curb at an intersection prepar- tory to widening the corner.

An Allis-Chalmers Speed Maintainer mounted on rubber tires doing maintenance and grading work near Chillicothe, Missouri.

Shots from the FIRING LINE

Modernization of Federal-Aid System Now Most Important Feature

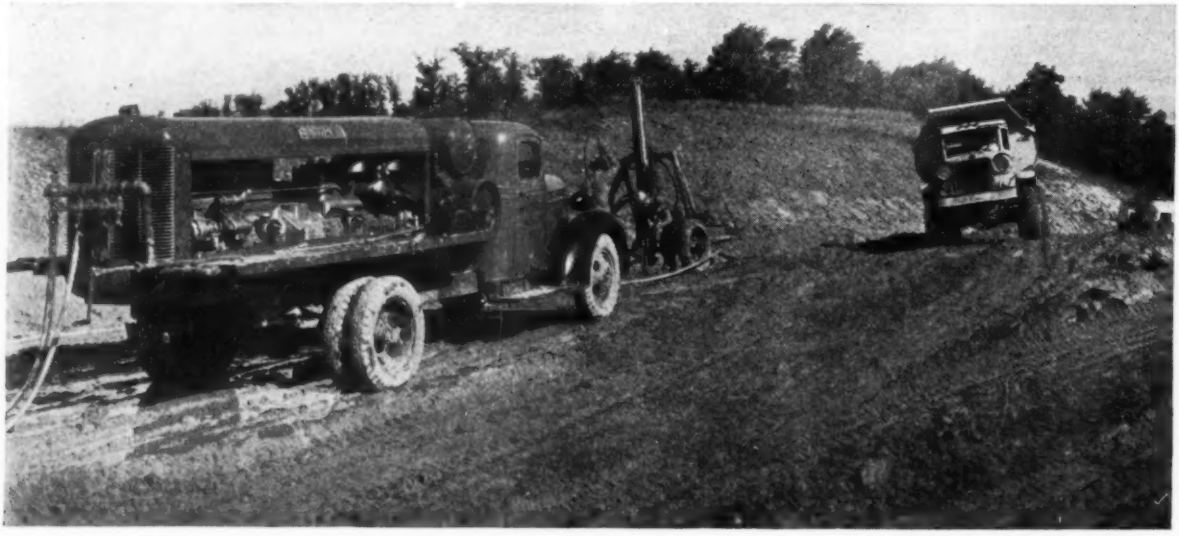
The system of main highways in the United States is by far the most extensive of any in the world. Only the most out-of-the-way places cannot now be reached over a surfaced road. Many miles of main highways are broad, direct routes over which vehicles can travel continuously at the touring speed selected by the driver without the need for slowing down because of sharp curves, steep grades, or other obstacles and there is frequent opportunity to pass overtaken vehicles. However, there is a large mileage of roads that cannot be traveled with such facility and ease; roads on which the driver must accommodate himself to conditions that are definitely inferior to present-day standards.

This is a condition that has been unavoidable and that is being corrected as rapidly as the necessary funds can be obtained. When the States and the Federal Government began the improvement of highways the network connecting our cities was largely unimproved. These roads had been planned for horse-drawn vehicles and the pioneer automobilists made few long trips over them. That such a large part of the network of main highways can now be traveled with ease and comfort is due to the intelligent, long-time distribution of annually limited funds over a selected system. A degree of improvement was effected, which, though generally recognized as less than that which would ultimately be necessary, was still sufficient to serve the immediate need. As the need for further improvement of various sections has become evident it has been met as promptly and as fully as was consistent with the early completion of a desirable minimum improvement of the system as a whole. This policy, sometimes called stage construction, is the only one under which the Federal-aid system and the more extensive State systems could have been improved in a short space of time to a general condition which permits their present use by a traffic of 150 billion vehicle-miles annually.

There are few sections of the Nation's network of main highways that have not been initially, if inadequately, improved. State and Federal appropriations, in large part, are now being devoted to supplementary improvements on the less adequate sections.

Many of our most used and important

• Model DG Streamlined Cletrac and Emsco Trailbuilder used for filling in the old Erie Canal near Buffalo, New York. Approximately 7 miles of the old canal are being filled in with 600,000 cubic yards of earth and ground turned over to the Parks Department.



• Model 315 Schramm Utility Compressor mounted on truck operating Cleveland Drill Rig on a new highway cut in Wisconsin.

roads are among those that must now be classed as very inadequately improved. These are the roads that were first recognized as of outstanding importance and as such were first improved with surfaces of the highest type designed according to the standards of early road builders. There was general acceptance of these standards as sufficiently advanced—in fact, there was much opposition on the grounds that they were too advanced. The great increase in highway use and the recent marked increase in vehicle speed have forced the adoption of much higher standards.

1937-38 Road Improvement Exceeds 10-Year Average

Over 15,000 miles of highway were improved during the past fiscal year in the program administered by the Bureau of Public Roads of the U. S. Department of Agriculture, according to the annual report of the bureau. The bureau also supervised the elimination of 711 grade crossings, reconstruction of 144 obsolete grade crossing structures, and protection of 744 crossings by signs and signals. Both the amount of work done per mile of improvement, and the total mileage improved, have considerably exceeded the average rates over the past 10 years.

The greater portion of the work was done in cooperation with State highway departments and in this way 12,129 miles of highway was improved. This work included 9,333 miles of rural portions of the Federal-aid highway system, 559 miles on municipal portions of the Federal-aid system, 201 miles of secondary roads in municipalities, and 2,036 miles of rural secondary roads.

Classified according to type of construction, the year's work in cooperation with the States consisted of 1,506 miles of graded and drained road; 4,998 miles of treated and untreated sand-clay, gravel, and macadam; 1,989 miles of low cost bituminous mix; 213 miles of bituminous macadam, 419 miles of bituminous concrete; 2,870 miles of portland cement concrete; and 134 miles of bridges, grade separations, and miscellaneous types.

Advancement during the year of the program of eliminating hazards to life at railroad grade crossings was an important contribution to highway safety. In addition to the protection of life and property, grade separations effect considerable savings in time and inconvenience to public travel on the highways, according to the report. More than half of the expenditures during the year for this class of work was in municipalities, reflecting the relatively greater danger and delays at city and suburban crossings.

The year saw the near completion of the emergency program of road construction, and was marked by the initiation of Federal aid for secondary and farm-to-market road construction and the extension of outright Federal grants for highway-railroad grade crossing elimination as parts of the regular Federal highway program.

During the year the bureau supervised road construction in National parks, National forests, reconstruction of flood damaged roads, and roads financed with funds allotted by the Public Works Administration and the Works Progress Administration. Work of this class aggregated 3,215 miles.

Employment on Road Work

Employment on highway work with Federal funds administered by the Bureau declined from 1,792,760 man-months in the fiscal year 1937 to 1,262,202 man-months in the past year. This was a direct result of the near exhaustion of the various special funds appropriated in previous years to provide employment. Employment provided by the emergency funds apportioned to all States dropped from 1,009,323 man-months in 1937 to 273,696 man-months in 1938. This was partly offset by an increase in the employment on regular Federal-aid highway and grade-crossing work which amounted to 538,579 man-months in 1937 and 778,488 man-months in 1938.

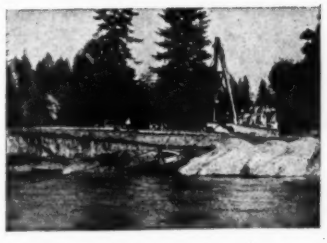
Construction of Secondary or Farm-to-Market Roads

Since the Federal Government first undertook the construction of secondary or farm-to-market roads in the emergency program initiated in 1933, there has been completed under Bureau supervision more than 31,000 miles of such road. This is considerably in excess of the Federal-aid roads constructed in the first 7 years of operation of the Federal-aid plan.

Employment of labor was the immediate objective of the emergency program and to this end projects for improvement were selected without delay. The selection was not a particularly difficult problem with so many much-used secondary roads demanding improvement but more careful selection of these highways is necessary if they are to give the greatest service. Improvement of secondary roads as part of the regular Federal-aid program, begun in the past year, has supplied the opportunity to undertake the planning of a connected system and methods of financing a continuing program.

The highway-planning surveys, now in progress, have as one of their most important objectives the supplying of all data needed in designating those secondary roads to be improved immediately and in annual programs to follow with definite provision for meeting all necessary costs.

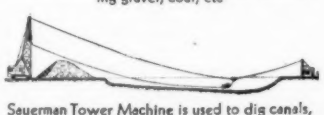
The rural highway program of the future should be directed along two principal lines: (1) The maintenance and needed enlargement of the serviceability of the main highways, and (2) the extension of reasonable improvement to those secondary and feeder roads that directly contribute to the



Sauerman Slackline Scraper drags gravel from river and builds revetment.

Sauerman Slackline Cableway digs in pit, river, or pond and conveys to bin or other elevated delivery point.

Sauerman Drag Scraper digs in hill or pit and hauls materials to hopper. Often is used for cut-and-fill work; also for stockpiling and reclaiming gravel, coal, etc.



Sauerman Tower Machine is used to dig canals, construct levees, clean out rivers, and similar work calling for a mobile machine with a long reach.

Vote Is Unanimous for Sauerman Machines on *Long Range* Work

For more than a quarter of a century, Sauerman Slacklines, Drag Scrapers and Tower Excavators have been used all over the world, digging and moving earth, gravel, clay, blasted ore and rock, coal and various bulk materials on thousands of different projects.

On work where materials are to be moved distances beyond the reach of a boom or dipperstick, a Sauerman machine has an advantage in being able to dig, haul and place the material in a continuous, straightline operation, doing away with the expense of rehandling.

Sauerman machines are designed in small capacities as well as large. There are light, portable units that can be used profitably to handle 50 to 100 tons per day and there are huge machines that will move as much as 1,000 tons per hour.

The Sauerman Catalog will be mailed anywhere on request

SAUERMAN BROS., Inc.
474 S. Clinton Street CHICAGO

For your convenience in writing to Sauerman Bros., Inc., you will find a card bound in this issue.

permanent use of rural lands. There is a close relation between these classes of roads both in usage and in the sources from which funds are drawn for their support. Expenditures made for one class will necessarily affect the amounts that can be made available for the other class. It is therefore of the greatest importance that the relative needs of each class be determind with all possible accuracy and that improvement of each class be planned with full consideration of these facts. Any other course must inevitably lead to unbalanced programs and economic loss resulting from inadequate highway service. The highway-planning surveys are producing the needed facts and the Bureau is cooperating with the States in developing highway programs, giving full attention to the designation of secondary road systems.

EXPENDITURES ON WPA HIGHWAY, ROAD AND STREET PROJECTS BY TYPES OF PROJECTS, BY OBJECTS OF EXPENDITURE, AND BY SOURCES OF FUNDS

Cumulated through June 30, 1938

Type of Project	Total	Federal	Sponsors'
TOTAL			
Highways, Roads and Streets	$1,845,053,339	$1,500,926,699	$344,126,640
Secondary Roads and Feeders	594,941,638	458,608,180	136,333,458
Streets and Alleys	471,510,335	390,375,759	81,134,576
Other Highway, Road & Street	778,601,366	651,942,760	126,658,606
LABOR			
Highways, Roads and Streets	1,328,993,861	1,269,850,343	59,143,518
Secondary Roads and Feeders	409,032,771	384,538,730	24,494,041
Streets and Alleys	335,522,752	322,824,001	12,698,751
Other Highway, Road & Street	584,438,338	562,487,612	21,950,726
NON-LABOR			
Highways, Roads and Streets	516,059,478	231,076,356	284,983,122
Secondary Roads and Feeders	185,908,867	74,069,450	111,839,417
Streets and Alleys	135,987,583	67,551,758	68,435,825
Other Highway, Road & Street	194,163,028	89,455,148	104,707,880

Source: WPA State Office reports of expenditures

13.5 Cents of Every State Tax Dollar Diverted in 1937

Thirteen and one-half cents out of every dollar of State taxes paid by highway users in 1937 was assigned to uses other than highways, according to statistics from State authorities collected by the Bureau of Public Roads of the U. S. Department of Agriculture. This is two and one-half cents less than the non-highway use in 1936. Highway user revenues distributed by the States amounted to $1,195,132,000.

These revenues included registration and license fees amounting to $410,401,000, gasoline taxes of $768,010,000, and special taxes on motor carriers of $16,721,000.

The revenues were distributed: $705,312,000 for State highway departments—a sum nearly equal to actual expenditures on primary State highways and urban extensions—$277,617,000 for local roads and streets, $8,261,000 for State park and forest roads, $42,529,000 for collection and administration, and $161,413,000 for education, relief and other non-highway purposes.

Highway user taxes have been justified on the grounds that they are needed for improvement of roads over which the vehicles must travel, according to the Bureau of Public Roads. The Bureau reports that there is no prospect that sufficient funds to correct all dangerous highway conditions can be provided in the immediate future and urges that all highway user revenues be devoted to highways.

A.R.B.A. Makes New Appointment

Robert E. Harper, director of public relations of the American Road Builders' Association, has been appointed to membership on the administrative committee of the newly organized Conference on Association Publicity. This committee is charged with the work of building up the group and aiding in the conduct of its affairs.

Mr. Harper originated the idea for and is one of the founders of this organization, which was formed by publicity directors of voluntary associations in order to provide opportunities for the discussion and solution of common problems. The first luncheon-meeting was held on December 6, with "Organizing for Publicity" as the topic for discussion.

Mississippi Valley Branch of A.G.C.A. Elects Officers

A. Guibet, vice president of the McWilliams Dredging Company, was elected President of the Mississippi Valley Flood Control Branch of the Associated General Contractors of America at the annual membership meeting in New Orleans in December.

Other officers elected for the ensuing year were C. B. Ford, Frank Stanford, T. J. Clarke, C. I. Jones, B. C. Tully and John R. Wilbanks, vice presidents; H. N. Rodgers, secretary-treasurer, and Fred D. Beneke, manager.

Directors elected for a new term include H. B. Blanks, T. J. Clarke, D. D. Coleman, Matthews Fletcher, C. B. Ford, A. Guibet, S. L. Hunter, Roy L. Igo, G. W. James, C. I. Jones, S. K. Jones, J. H. Lewis, C. J. List, C. J. Lowrance, J. H. Morrow, H. N. Rodgers, Frank Stanford, H. J. Sternberg, B. C. Tully and John R. Wilbanks.

Accepting the suggestion of C. B. Ford, Mr. Guibet will call frequent meetings of the Association at the time of important lettings at Memphis, Vicksburg and New Orleans for a free discussion of current problems before the contracting fraternity.

digging ability is an inherent characteristic of every Owen Bucket
Exceptional digging ability gained the original acceptance for Owen Buckets and has maintained its position of leadership throughout the years. To this desirable attribute add uncommon durability and great versatility and you have the bucket that pays the largest dividends in proportion to investment.
Get the Owen Catalog.
The OWEN BUCKET Co.
6095 Breakwater Ave., Cleveland, Ohio
Branches: New York Philadelphia Chicago Berkeley, Cal.
A MOUTHFUL AT EVERY BITE

For your convenience in writing to The Owen Bucket Co., you will find a card bound in this issue.

• A Rex 3-yard Moto Mixer delivers dark colored top mixture containing emulsified carbon black on a 2.81 mile section of the Meadowbrook Parkway for the Long Island State Park Commission. The Moto Mixer traveling parallel with the pavement delivers the concrete to an 11-foot lane as illustrated. Concrete is spread with hand rakes and struck off with a mechanical finisher. The Tuckahoe Construction Company, Inc., of Tuckahoe, New York, are the contractors.

Thirty Contractors Share Central Valley Project

With heavy construction just beginning, one-third of the states of the United States are represented in construction contracts awarded to date on the Central Valley Project.

Thirty contracting firms from 16 states have shared the work so far started or already completed, it is announced by Walker R. Young, Supervising Engineer for the United States Bureau of Reclamation. Several additional states are represented in separate contracts for materials and supplies required for the construction.

Contracts have been awarded in excess of $40,000,000 and more than 2,000 persons now are employed by the Bureau of Reclamation and its contractors.

On the Kennett Division at the northern end, foundation excavation is proceeding on both abutments of the Shasta Dam site near Redding and in a temporary diversion channel along the Sacramento River. Construction also is under way on a temporary railroad by-pass tunnel through the west abutment, and on a warehouse and storage yard at Coram downstream from the dam site.

The Government Camp three miles east of Shasta Dam is completed and occupied. The general contractor's camp is nearing completion in the canyon just below the dam site, with the contractor's office and one dormitory occupied and the mess hall operating.

A contract has been executed with the Southern Pacific Company for relocation by the United States of 37 miles of main line railroad north of Redding on a new 30-mile route around the future Shasta Reservoir. First construction on the relocated line is under way on a 4,346-foot railroad bridge across the Sacramento River at Redding. Contracts also have been awarded or bids received for half of the 30 miles of railroad grading, four tunnels and two additional bridges.

On the Delta Division, the first four miles of the Contra Costa Canal are completed from Rock Slough to Oakley, construction is proceeding on the next eight-mile section between Oakley and Antioch, and contracts have been awarded for building an additional eight miles of canal past Antioch and Pittsburg and for building four pumping plants near Oakley. Field location of the canal is completed by Bureau of Reclamation engineers for the entire 46 miles to near Martinez.

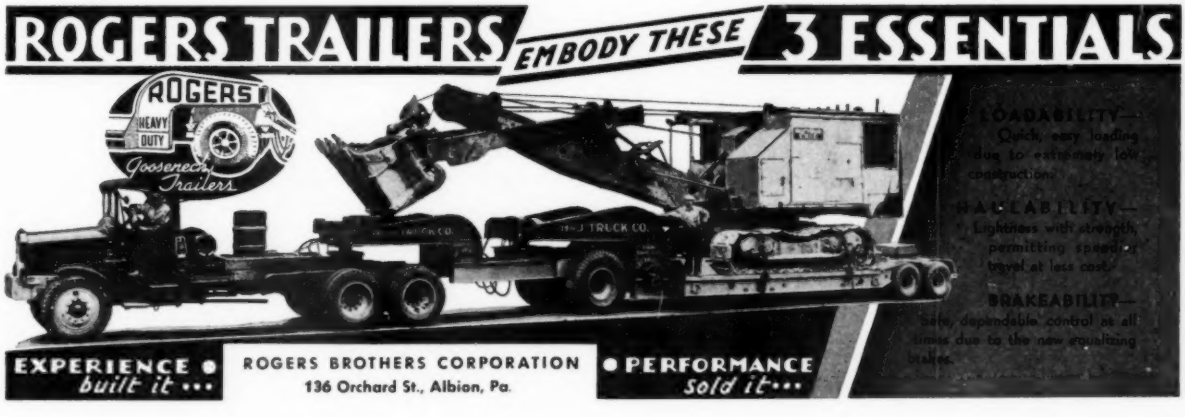
1939 Asphalt Meeting to Be At Los Angeles

For the first time in its history, the asphalt industry will hold its meeting on the West Coast, Los Angeles being designated as the city in which the Twelfth National Asphalt Conference will be held, during the week of February 20th, 1939. The meeting will be under the auspices of The Asphalt Institute with J. E. Pennybacker, Managing Director, General Chairman and Daniel B. Miller, Managing Engineer of the Pacific Coast Division, Co-chairman.

This Conference, open to all interested, will be attended by highway officials, engineers and technologists from this and foreign countries and is timed to gear the asphalt industry to complete cooperation with the current billion-dollar-a-year road-building program in counties, cities and states.

A particular feature, due to the choice of Los Angeles, will be the opportunity afforded the engineers of the entire country to inspect the asphalt pavements which cover the Golden State's principal highway routes and are unsurpassed in the world.

J. S. Helm, of the Standard Oil Company of New Jersey, and President of The Asphalt Institute, in opening the Conference, will outline world progress in highways as reported to the Eighth International Road Congress, just completed at The Hague. Mr. Helm attended as a delegate from the United States government.


ROGERS TRAILERS EMBODY THESE 3 ESSENTIALS
ROGERS
HEAVY DUTY
Gooseneck Trailers
LOADABILITY—
Quick, easy loading due to extremely low construction.
HAULABILITY—
Lightness with strength, permitting speedy travel at less cost.
BRAKEABILITY—
Safe, dependable control at all times due to the new equalizing brakes.
EXPERIENCE • built it •••
ROGERS BROTHERS CORPORATION
136 Orchard St., Albion, Pa.
• PERFORMANCE Sold it •••

For your convenience in writing to Rogers Brothers Corporation, you will find a card bound in this issue.

1939 Highway Forecast

(*Continued from page 19*)

Gravel	5,494,000
Grading	2,656,500
Bridges	11,021,000
Grade separations	1,344,000
Roadside improvement	164,000

The following sources will furnish the available funds during 1939.

Federal Aid	$ 2,926,000
Motor Tax	4,700,000
Bond	8,363,000
Total	$15,989,000

Of this amount construction work will get $10,739,000; maintenance $3,500,000; equipment $250,000; miscellaneous $1,500,000.

Maine

Unless the legislature, which meets this winter, makes a change in allocation of funds, it is expected that Maine will have about the same amount for highway use as in 1938. This money will be composed of the 1940 Federal Aid funds which are to be apportioned to the States prior to January 1, and about $250,000 of regular Federal Aid which will be carried over from the 1939 apportionment. There will also be $246,000 for grade crossing elimination available from the 1939 apportionment. There will be $1,000,000 in State Highway Bonds available toward matching Federal Aid.

The gas tax and motor vehicle license fees, together with small amounts received for permits to open highways, fines, etc., compose the general highway fund. This general highway fund was allotted for the fiscal year 1939 as follows:

Interest and Retirement of bond issues.

Registration Bureau	$ 130,000
State Highway Police	270,000
State Highway Commission Administration	125,000
Gas Tax Administration and Refunds	190,000
Special Legislative Resolves	150,000
State Aid Highways (State's share)	630,000
Third Class Highways	670,000
To match regular Federal Funds if necessary	275,000
To use with Federal funds for Grade Crossing Elimination	75,000
To Match Federal Aid Secondary funds if necessary	250,000
Bridge Construction	500,000
Maintenance	3,400,000
Additional Special Legislative Resolves	68,300
Maintenance of Unimproved Roads	200,000
Remainder for the construction of bridges and maintenance of State Highways and State Aid Highways.	

Maryland

An increase of 3 per cent over the 1938 budget gives Maryland a total of $17,951,267 for the 1939 highway program.

Federal Aid will provide $1,018,447, and other Federal funds, $713,529. The State gas tax income will be $9,982,775, while vehicle license fees and other sources will bring an additional $6,236,516.

Preliminary plans indicate that the expenditures will be divided as follows: Construction, $5,886,700; maintenance, including county roads $3,255,164; other costs, including diversion, $8,809,403.

Construction funds will be allocated to 140 miles of grading totaling 2,000,000 yards, $600,000; 25 miles of gravel surfacing requiring 125,000 tons of material, $545,000; 65 miles of high type paving requiring 150,000 tons of stone and 95,000 tons of sand, $3,600,000; 50 miles of low type paving requiring 110,000 tons of stone and gravel, $455,000; and two bridges costing $8,741,000, which will be partly financed by a Special Bond Issue and Federal grant. About 1,000,000 yards of previously awarded excavation, costing $300,000, will be carried into 1939.

Diversion in Maryland in 1938 amounted to $1,804,000.

Massachusetts

Because flood and hurricane damages of September 1938 may cause special appropriations in 1939 just as they did in 1938, and because the legislature does not hold its annual meeting until January, G. H. Delano, Chief Engineer, reports that it will be impossible to forecast highway plans for Massachusetts. The following, however, is a report of the work done in 1938 and shows a little of what can be expected during the next twelve months.

Expenditures in 1938 were 129% greater than during the

• **The Contec Sand and Gravel Company of Lawrel, Maryland, use an Ingersoll-Rand two-stage air-cooled Portable Compressor with a back fill tamper and paving breaker. Here they are strengthening a bad curve on Washington Boulevard between Washington and Baltimore.**

FEDERAL AID SECONDARY OR FEEDER ROAD PROJECTS
AS OF OCTOBER 31, 1938

STATE	COMPLETED DURING CURRENT FISCAL YEAR			UNDER CONSTRUCTION			APPROVED FOR CONSTRUCTION			BALANCE OF FUNDS AVAILABLE FOR PROGRAMMED PROJECTS
	Estimated Total Cost	Federal Aid	Miles	Estimated Total Cost	Federal Aid	Miles	Estimated Total Cost	Federal Aid	Miles	
Alabama	$ 73,700	$ 36,850	10.7	$ 488,300	$ 243,850	27.1	$ 344,805	$ 170,550	11.8	$ 601,722
Arizona	281,361	187,459	18.6	111,297	70,491	6.8	86,796	51,357	10.7	347,175
Arkansas				19,426	12,863		195,706	195,541	21.5	655,704
California	484,307	279,472	45.9	1,231,089	668,519	51.6	772,772	392,914	40.1	506,321
Colorado	439,466	243,558	31.6	581,370	322,425	30.1	156,140	65,010	7.3	290,575
Connecticut				79,344	39,512	1.3	38,340	19,135	.3	259,631
Delaware				59,680	29,840	10.9	44,024	22,012	6.0	195,023
Florida				20,122	10,061		293,782	146,850	4.9	517,941
Georgia	197,440	96,612	23.8	488,118	240,059	61.2	292,280	146,140	44.0	771,911
Idaho	240,507	110,501	40.2	268,483	117,491	17.1				246,379
Illinois	775,700	387,850	69.7	1,569,392	730,696	107.6	764,900	373,950	47.1	534,419
Indiana	370,100	144,250	42.9	818,500	391,450	77.9	798,948	384,152	68.9	322,586
Iowa										1,298,449
Kansas	43,670	21,835	.5	95,410	47,705	13.3	236,972	118,485	42.7	1,130,946
Kentucky	486,158	142,751	64.0	829,660	233,659	55.6	868,143	255,398	77.6	182,618
Louisiana				267,530	119,085	21.9	801,332	335,820	67.1	269,231
Maine	240,400	120,200	15.8	378,226	183,996	19.9	18,700	9,350	1.2	15,027
Maryland				45,164	15,787	5.8	237,800	95,400	12.7	301,289
Massachusetts				78,010	39,005	1.4	237,740	118,080	4.9	489,315
Michigan	41,961	19,481	7.1	796,744	398,372	61.2	290,250	145,125	10.3	972,561
Minnesota	217,978	101,203	30.8	484,284	237,735	53.3	262,924	131,462	10.4	909,180
Mississippi				299,000	149,500	23.8				739,427
Missouri	255,371	125,865	35.2	197,480	98,350	14.4	573,710	253,365	103.2	588,092
Montana				13,983	7,865					1,027,170
Nebraska	299,900	149,950	47.4	406,738	203,369	67.2	516,788	248,693	90.0	394,745
Nevada	344,302	295,660	50.8	102,833	86,034	24.7	48,020	41,642	3.5	71,016
New Hampshire	97,426	48,277	1.8	151,155	75,181	4.3	81,281	39,806	2.4	83,611
New Jersey				274,120	135,215	5.0	48,780	17,500	.1	520,058
New Mexico	404,779	246,873	17.6	333,076	183,006	23.4	470,128	234,453	26.7	142,440
New York	1,673,234	833,319	118.0	2,107,000	1,053,500	122.1	452,800	213,900	25.8	261,776
North Carolina	302,920	151,460	36.3	980,204	486,630	84.7	208,720	96,490	18.0	347,275
North Dakota	33,860	18,135	5.5	119,670	64,092	29.3	115,886	62,065	8.5	642,960
Ohio	156,560	78,280	3.8	27,840	13,920		164,600	81,750	10.2	1,657,691
Oklahoma	12,200	6,491		396,738	209,979	34.3	449,030	215,734	29.9	752,711
Oregon	376,674	228,080	53.5	80,975	49,452	2.5	55,431	24,900	7.6	452,701
Pennsylvania	1,108,373	534,838	84.9	1,485,615	732,319	80.6	1,110,998	517,049	58.8	332,478
Rhode Island	66,840	33,420	3.5	121,188	60,594	4.0	131,140	65,570	1.7	28,307
South Carolina	155,841	69,232	16.6	811,345	345,230	93.4	300,420	112,900	28.2	151,318
South Dakota				11,300	6,250					816,436
Tennessee	78,900	39,450	2.2	631,306	242,753	34.3	159,480	79,740	5.0	697,547
Texas	1,080,001	505,260	177.8	2,053,183	897,470	220.0	1,000,701	434,555	124.6	1,287,484
Utah	375,496	205,870	38.8	226,449	120,125	15.9	75,170	37,360	8.7	187,015
Vermont	192,650	84,150	11.6	138,306	69,153	6.2	43,300	20,500	.5	35,793
Virginia	333,947	164,758	43.4	824,230	362,175	54.3	99,190	49,595	8.5	315,471
Washington	400,253	210,000	43.0	257,753	135,578	22.1	413,793	202,600	26.0	182,378
West Virginia	124,300	62,150	9.5	119,750	59,875	11.9	108,950	54,475	6.2	373,174
Wisconsin	141,919	62,885	4.6	989,096	481,460	47.8	109,051	54,000	2.1	613,883
Wyoming	389,390	240,600	53.9	302,002	186,599	12.6	187,238	115,691	14.8	42,303
District of Columbia										
Hawaii				56,250	28,125	2.4				218,750
Puerto Rico				272,250	135,660	15.2				111,225
TOTALS	12,297,884	6,287,025	1,261.3	22,500,984	10,836,050	1,680.4	13,666,959	6,451,064	1,101.5	23,893,238

year previous. The total fund of $30,575,136 being used as follows:

Construction (including Fed. Aid)	$ 7,063,321
Maintenance (State Highway)	4,455,875
Special Appropriations (flood and hurricane repairs)	14,250,000
Overhead, State Aid Work, etc.	4,805,940

Federal Funds used in 1938 amounted to $3,438,321 while State Funds, gathered from the State Gas Tax, Vehicle License Fees and Bond Issues totaled $27,136,815. No highway funds were diverted during the year.

Regular Federal Aid Funds were divided in the following manner:

	Miles	Amount
Grading (Excavation & Borrow)	29.4	$1,000,000
Paving, high type	29.4	950,000
Drainage & misc.	29.4	700,000
Bridges	(12)	350,000

Approximately 1,000,000 yards of highway excavation work awarded in 1938 or before will carry over into 1939 and will be finished at a cost of around $330,000. This does not include State Aid or Flood Repair work.

Michigan

This being a legislative meeting year for Michigan, there is the usual possibility of changes being made in the allocation of weight and gasoline tax funds. If no changes are made, however, the Michigan Construction program should be approximately 20% over 1938.

The outlook for 1939 construction, according to H. C. Coons, Deputy Commissioner-Chief Engineer, includes the matching of available Federal Aid Funds and the expenditure of current Grade Crossing grants. These programs are expected to produce 150 miles of high type surfacing, 53 miles of low type surfacing, 56 miles of grading and drainage, and the construction of 14 bridges and 6 grade separations.

The Department of Highways has been allocated a PWA grant in the amount of $1,937,790 that will provide for varied types of improvements on non-Federal Aid routes. The program is expected to develop approximately $4,500,000 of work, all of which must be completed in 1939. Included in this program are 19 bridges, 232 miles of oil-aggregate surfacing, and 107 miles of grading, drainage and stabilized gravel surfacing.

The adoption of a constitutional amendment to prevent the diversion of gasoline and weight tax receipts for non-highway purposes through the efforts of the Michigan Good Roads Federation is particularly gratifying. The voters of the state, who have a deep interest in two great industries, the manufacture of automobiles and the tourist business, overwhelmingly decided that motorist taxes should not be placed on the auction block.

Minnesota

State Gas Tax will furnish $11,000,000 of the $28,500,000 to be used on Minnesota roads during 1939. The remaining funds will come from Federal Aid ($8,500,000) and Vehicle Licenses and other sources ($9,000,000).

The total will be divided three ways. Construction (including rights-of-way and administrative engineering) will amount to $17,000,000 and Maintenance (including Highway Patrol, Safety, etc.) will use $6,500,000. The remaining $5,000,000 will be put to other highway uses.

Construction funds will be used on Minnesota roads in the following way:

	Miles	Amount
Grading	200	$2,400,000
Surfacing		
Gravel or crushed stone	100	700,000
Oil Treatment	200	200,000
Paving, high type	27	1,000,000
Paving, low type	200	1,400,000
Bridges	(40)	3,500,000

No highway funds were diverted in Minnesota during 1938 and no highway excavation work awarded in 1938 will carry over into 1939.

Mississippi

Highway funds available in Mississippi for 1939 amount to approximately $31,500,000. Of this amount $1,500,000 has been allocated for maintenance work and the remainder for construction.

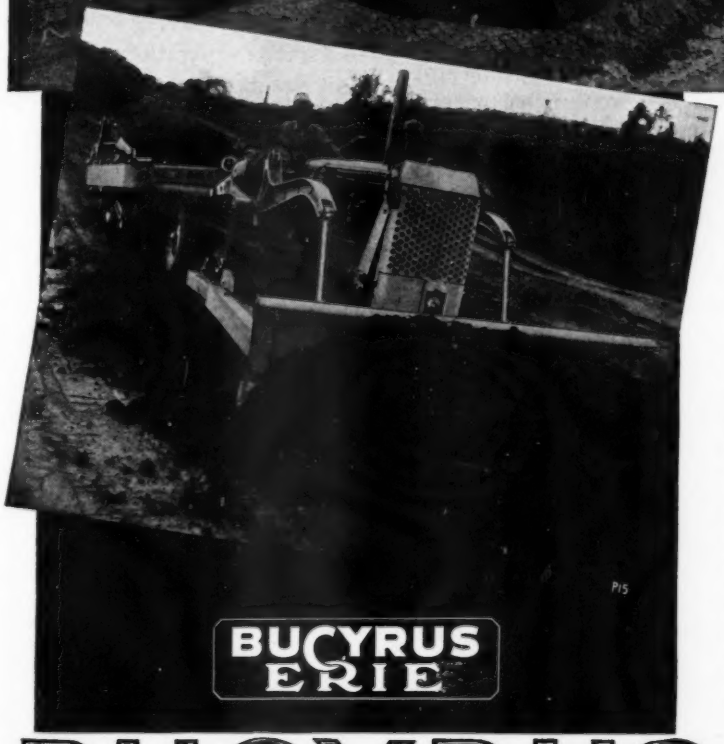
Only about $11,860,000 of the thirty million dollars will be spent on construction during 1939. R. A. Harris, Chief Engineer, states that a highway program for the expenditure of the whole amount has not yet been completed. Present construction plans are as follows:

	Miles	Amount
Grading	250	$4,500,000
Surfacing (all kinds)	350	6,500,000
Grade Separation Projects	---	860,000

Mississippi's highway funds are available from the following sources: Federal Aid (1938-39) $1,671,816; P.W.A. $1,650,000; State Gas Tax Bond Issue $26,678,184.

• An International TD-40 Diesel TracTracTor and Bucyrus-Erie 2-wheeled scraper climb a steep bank on the way to the borrow pit on a dirt moving project near Minneapolis, Minnesota.

GRADING A ROAD, *Single-handed*



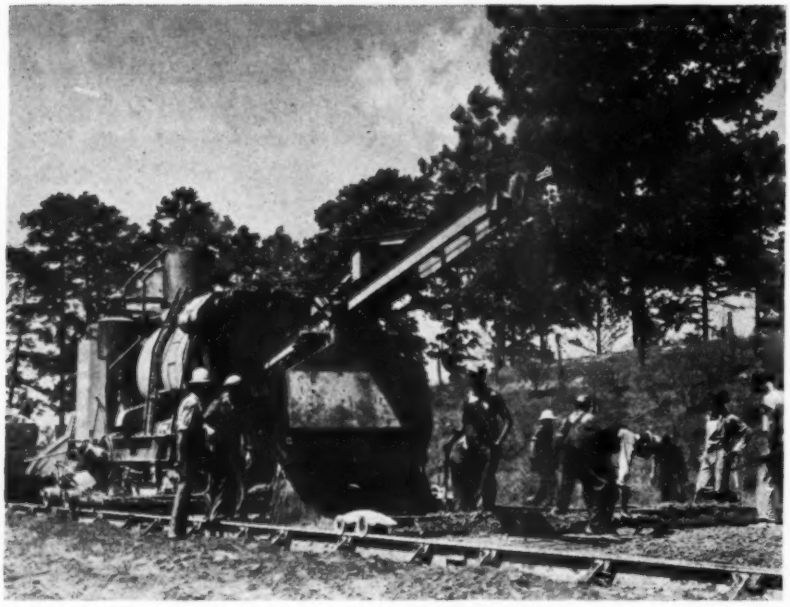
ONE MAN, the tractor operator, handles the full range of dirt-moving on a road job—from blazing the trail to completing the grade—when his tractor has a Bucyrus-Erie Scraper hitched to its drawbar and a Bucyrus-Erie Bullgrader mounted in front. On the job illustrated here, a front-end oil pump mounting furnishes hydraulic power for the Bullgrader blade, and a drum winch at the rear of the tractor powers the single cable that controls the 4-Wheel Scraper. In dual service with the Scraper, the Bullgrader levels fills, maintains hauling roads and finishes grades. The blade may be angled to the right or left for smooth, accurate grading, or set straight across for bulldozing. Write for complete details on Bucyrus-Erie's modern tractor equipment, or see your nearest International Industrial dealer.

BUCYRUS ERIE

BUCYRUS - ERIE

SOUTH MILWAUKEE, WISCONSIN, U. S. A.

For your convenience in writing to Bucyrus-Erie Co., you will find a card bound in this issue.



• A Koehring Twinbatch Paver owned by the Ziegler Construction Company operating on U. S. 45 approximately two miles south of Booneville, Mississippi.

In addition to the work above 8,000,000 yards of highway excavation awarded in 1938 or before will carry over into 1939. This work amounts to $1,600,000. Total contracts awarded in 1938 amounted to approximately $17,800,000.

Missouri

According to C. W. Brown, Chief Engineer of the Missouri State Highway Department, information now on hand indicates that approximately $7,000,000 will be available for all types of highway construction including trunk system and secondary system roads. In addition to this amount there will be available approximately $2,300,000 in Federal Grade Separation funds, all of which will be contracted in 1939.

Types of highways have not yet been given final consideration, but it is estimated that the funds available will finance approximately 250 miles of all types of construction including bridges.

No highway funds were diverted in Missouri in 1938, and because of a constitutional amendment prohibiting diversion none will be diverted in 1939.

Montana

W. O. Kivley, Office Engineer, reports an 85% increase in Montana where an estimated $9,350,000 is to be spent on highways during 1939. Of this total $5,650,000 will be used for construction; $2,100,000 for maintenance; and the remaining $1,600,000 for purposes of a more general nature.

• Building roads in the wide open spaces of Montana with an Adams Leaning Wheel Grader and an International TracTracTor. Musselshell County, located in the west central part of the state, is the owner.

Construction funds are to be used for:

	Miles	Amount
Grading	275	$2,640,000
Surfacing—Gravel or Crushed Stone	325	1,700,000
Oil Treatment	120	360,000
Bridges (number)	55	950,000

Approximately 600,000 yards of highway excavation awarded in 1938 or before will be carried over into 1939 at an additional cost of $120,000.

Montana funds will come from three sources:

Federal Aid	$3,650,000
State Gas Tax	4,500,000
Other	1,200,000

There was no diversion of highway funds in Montana during 1938.

Nebraska

Nebraska highway plans for 1939 are dependent on the state legislature meeting in January and on Federal Aid allotments.

In 1938 the state spent $8,000,000 on highway improvements in the following manner:

- 613 miles of new grading
- 408 miles of new gravel
- 383 miles of paving
- 7 grade separations
- 149 bridges
- 13 armored crossings
- 13 roadside improvement projects
- 12 sets of reflectorized railroad crossing signs and one set of traffic signals

FEDERAL AID GRADE CROSSING PROJECTS
AS OF OCTOBER 31, 1938

STATE	COMPLETED DURING CURRENT FISCAL YEAR					UNDER CONSTRUCTION					APPROVED FOR CONSTRUCTION					BALANCE OF FUNDS AVAILABLE FOR PROGRAMMED PROJECTS
			NUMBER					NUMBER					NUMBER			
	Estimated Total Cost	Federal Aid	Grade Crossings Eliminated by Separation or Relocation	Grade Crossing Structures Reconstructed	Grade Crossings Protected by Signals or Otherwise	Estimated Total Cost	Federal Aid	Grade Crossings Eliminated by Separation or Relocation	Grade Crossing Structures Reconstructed	Grade Crossings Protected by Signals or Otherwise	Estimated Total Cost	Federal Aid	Grade Crossings Eliminated by Separation or Relocation	Grade Crossing Structures Reconstructed	Grade Crossings Protected by Signals or Otherwise	
Alabama	$220,910	$220,910	5		4	$544,948	$543,924	6			$428,505	$427,600	5		3	$793,085
Arizona						9,452	9,452									620,761
Arkansas	46,565	45,628	3			423,519	423,299	7			124,319	124,039	4			1,165,803
California	366,760	366,760		2		1,266,665	1,266,090	7	2		196,046	196,046	2			1,871,313
Colorado	30,465	27,839	1		1	61,728	61,728	1			38,842	35,082			16	1,163,663
Connecticut						18,930	12,665									831,825
Delaware	11,500	11,500			3						65,770	65,770			20	416,480
Florida						196,216	196,216	2			207,100	207,100	1			1,002,481
Georgia						45,786	45,786	1			338,250	338,250	5		1	2,033,351
Idaho	87,825	87,652	1			177,264	177,264	3			173,299	159,270	4			398,684
Illinois	186,500	186,500	1		1	1,544,675	1,544,675	5	2		896,230	896,230	9		60	2,577,238
Indiana	408,486	322,500	2	3		462,000	435,100	3	2		689,780	689,780	1	1	89	966,769
Iowa	640,258	606,297	5		11	570,770	538,800	7	1	6	36,420	33,900		2	4	1,388,564
Kansas	456,074	456,074	8		4	383,515	383,515	5			675,801	675,801	8		7	1,059,118
Kentucky	145,000	145,000	1			51,100	51,100	1			584,830	584,830	7	2	31	1,033,115
Louisiana	48,590	48,590	2			225,285	196,478	3			248,872	248,090	9			1,132,503
Maine						327,315	327,315	3	2		69,830	69,830	1		1	245,468
Maryland						64,586	64,586	1								962,247
Massachusetts	844,383	837,972	7	1	7	275,196	275,000	1	2		235,125	233,194		3		1,405,094
Michigan	40,218	40,218		1	1	689,516	689,516	7	1	38	81,290	81,290		1		1,676,407
Minnesota						770,180	770,180	3	5		5,589	5,589			1	1,689,147
Mississippi						406,900	406,900	5			308,900	308,900	2			868,351
Missouri	128,120	128,120	2	1		223,970	223,970	2			453,520	453,520	2	1		2,219,643
Montana	248,112	243,230	3			556,992	556,992	5								584,249
Nebraska	150,374	150,374	4			390,393	390,393	10			556,270	556,270	8		33	667,373
Nevada	97,187	97,187		2	2						157,121	157,121	1	1	3	204,333
New Hampshire	61,732	61,425		1		93,487	93,428	5			4,590	4,590			2	334,307
New Jersey						210,005	204,779	2	1		130,800	130,800		1	2	1,634,678
New Mexico	109,669	109,669	4			196,671	196,671	3	1							545,151
New York	141,400	141,400		1	2	2,447,252	2,438,751	9	8		148,600	148,150		1		4,041,628
North Carolina	73,550	73,550		1		771,710	739,010	6	4		300,730	300,730	2	1	11	1,331,104
North Dakota						606,278	606,278	2	2							972,943
Ohio						95,850	95,850	2			640,700	640,700	7			3,492,618
Oklahoma						17,343	17,343				129,105	128,305			34	2,135,861
Oregon	308,391	307,742	1	2		58,634	58,634									608,955
Pennsylvania	138,043	122,837	1			161,073	161,073	1			143,528	138,621	1			5,310,004
Rhode Island						335,019	335,019	1	2							158,731
South Carolina						169,559	114,593	3	2		215,610	215,610	10		38	1,158,899
South Dakota	91,230	91,230	1		6	250,628	250,628	2	2	3	90,870	90,870	4		2	887,372
Tennessee						14,381	14,381				105,010	105,010		2	5	1,772,642
Texas	34,527	33,861	2			1,219,529	1,218,452	12	5		301,040	254,605	3			3,836,198
Utah	97,174	97,174	2		1	47,359	47,359	2			5,319	5,319			3	423,211
Vermont	202,882	197,882	6	1		29,964	29,964		1	1	31,640	31,640			11	220,950
Virginia	245,670	245,670	12	1		241,018	241,018	3	1		386,338	386,338	4	1	8	923,004
Washington	149,718	147,618	1	2	2	613,456	613,456	7	2		87,926	87,926		1	8	534,800
West Virginia	120,100	119,080	1			315,009	315,009	1			40,070	40,070	2		6	649,939
Wisconsin	162,493	162,493	2			1,246,886	1,160,026	12								1,150,990
Wyoming	30,890	30,890		1	1	135,630	135,630		1		15,960	15,960			6	494,250
District of Columbia											34,262	34,262		1		291,169
Hawaii						33,230	33,230	1			152,570	152,570	2	1		307,950
Puerto Rico						214,569	213,370	4								516,930
TOTALS	6,124,796	5,964,872	78	20	46	19,211,441	18,924,896	166	49	48	9,536,377	9,459,578	104	20	405	62,791,349

Nevada

An estimated decrease of 29% in Nevada's highway funds for the year 1939 will give them a total of $3,459,157 available. Of this amount $2,349,157 will be used for construction; $850,000 for maintenance, and $260,000 for other purposes.

Construction funds will be divided in somewhat the following manner:

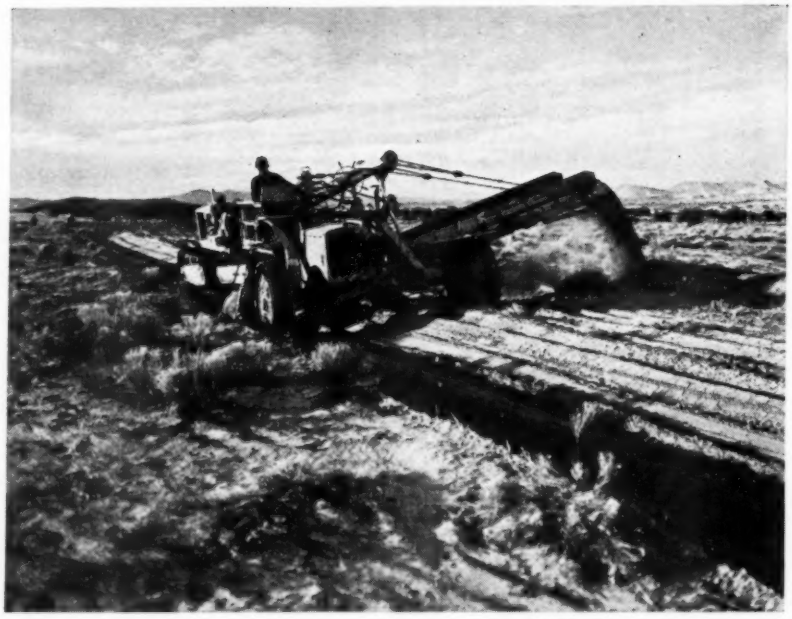
	Miles	Amount
Gravel or crushed stone surfacing	28.4	$187,690
Oil Treatment	11	53,000
Paving, high type	27.7	695,000
Paving, low type	69.4	870,000
Bridges (number)	4	167,000

In addition to the work listed above, an estimated 380,000 yards of excavation awarded in 1938 or before will carry over into the 1939 program. This will be done at an estimated cost of $100,240.

Highway funds will be available from the following sources:

Federal Aid	$1,909,157
State Gas Tax	1,150,000
Vehicle License fees and other	400,000

A state law prohibits highway fund diversion in Nevada.



• This highway relocation job between Bernalillo and Cuba, New Mexico, is being done by A. O. Peabody of Santa Fe, New Mexico. The Caterpillar "48" Elevating Grader is side casting from high to lower side of road to level up a 10% slope. Material is extremely soft, loose desert sand.

New Hampshire

While the added liabilities caused by the hurricane last September make it almost impossible to give an accurate forecast, it appears that New Hampshire will have approximately $3,812,000 available for highways during 1939. At present, plans call for putting $2,600,000 of this amount into maintenance; $755,000 into construction; and using the remaining $457,000 for other purposes. These allotments may be changed at any time, however, if it is decided that the funds can be used more advantageously in repairing hurricane damages.

The State Gas Tax will furnish an estimated $2,450,000 and Vehicle Licenses and other sources will add $2,500,000 more. An additional $225,000 is due under the Federal Aid System for projects already financed.

• 18,000 feet of Godwin Self-Aligning Expansion joints are being used on approaches to the Bronx-Whitestone Bridge, the northern approach to the New York World's Fair. Johnson, Drake & Piper of Freeport, New York, are the contractors.

New Jersey

Motor Vehicle Fees and State Gas Tax will total approximately $13,000,000 in New Jersey. It appears very likely, however, that a great deal of the money will be diverted to other uses such as direct relief, etc. The expenditure or diversion of the fund is dependent entirely on the state legislature.

If New Jersey elects to match funds for the Federal Aid highway system and for the secondary or feeder roads the National government will make available $1,662,041 for the former and $332,408 for the latter during the fiscal year 1939. Too, Federal Aid will supply $972,568 for grade crossing eliminations. This fund does not have to be matched by the state.

New Mexico

The Federal Aid Allotment for New Mexico during 1939 is $1,600,000. In order to obtain this amount which includes appor-

Illustrated is a Bucyrus-Monighan 3-W owned by Henry J. Kaiser & Co., working at Radum Gravel Plant 30 miles east of Oakland, California.

THE big output you get with a Bucyrus-Monighan dragline is the result of (1) long reach and big capacity, (2) fast swing, (3) less time out for maintenance and repairs, (4) easier maneuvering and less moving delay, (5) better positioning for digging and range, (6) continuous all-weather operation. With outstanding digging ability proved in world-wide service, the Bucyrus-Monighan Walker presents modern output capacity and economy that no dragline organization should overlook. Study the advantages of these machines for your jobs. Manufactured by Bucyrus-Monighan Co., Chicago, Illinois.

BUCYRUS-MONIGHAN

Sold by: BUCYRUS-ERIE CO., SOUTH MILWAUKEE, WISCONSIN, U. S. A.

For your convenience in writing to Bucyrus-Erie Co., you will find a card bound in this issue.

• A gasoline driven, crawler mounted Haiss Excavator owned by the Brugel Contracting Company of Forest Park, New York, excavating subgrade for a sidewalk in one of the parks.

tionments for the Federal Aid highway system, secondary or feeder roads, and grade crossing elimination it will be necessary for the state to match approximately 40% of this amount. The funds for matching the federal allocations must be appropriated by the state legislature when it convenes in January.

Federal Land Funds to the extent of $200,000 are also available for highway work. How these funds will be used has not yet been decided.

New York

The state constitution requires that all highway income in the state of New York must first go into the State Treasury and be appropriated out by the legislature. Highway department funds are directly dependent on legislative action and although the legislature meets in January they seldom appropriate highway funds before March 1.

Federal Aid for New York is available as follows: For roads on the Federal Aid highway system $6,105,009 and for secondary or feeder roads $1,221,002 (both of these appropriations will be available only if matched by the state). The Federal Aid fund for grade crossing elimination amounts to $3,345,530 and does not require any matching by the state.

North Carolina

State Gas Tax and Vehicle Licenses will make up 75.8% of the $20,600,000 to be spent on North Carolina highways during 1939. The other 24.2% will be made up from Federal Aid and other sources.

Of the total amount allocated for use on the roads, $8,300,000 will be spent for construction and the remaining $12,300,000 will be spent for maintenance.

J. L. Morson, Roadway Planning Engineer, has indicated the division of the $8,300,000 construction fund as follows:

Type of work	Miles	Amount
Grading	255	$1,680,000
Surfacing (topsoil, sand-clay or gravel)	270	590,000
Surfacing (crushed stone)	155	790,000
Oil Treatment	340	1,285,000
Paving, High Type	80	1,980,000
Paving, Low Type	60	595,000
Bridges (including overhead crossings & underpasses) and culverts	--	1,380,000

• Semi-Portable Telsmith Quarry Plant in operation between China Grove and Rockwell, North Carolina, on Project No. 6703—State Highway and Public Works Construction on Route 152. The plant is owned by Nello Teer of Durham, North Carolina.

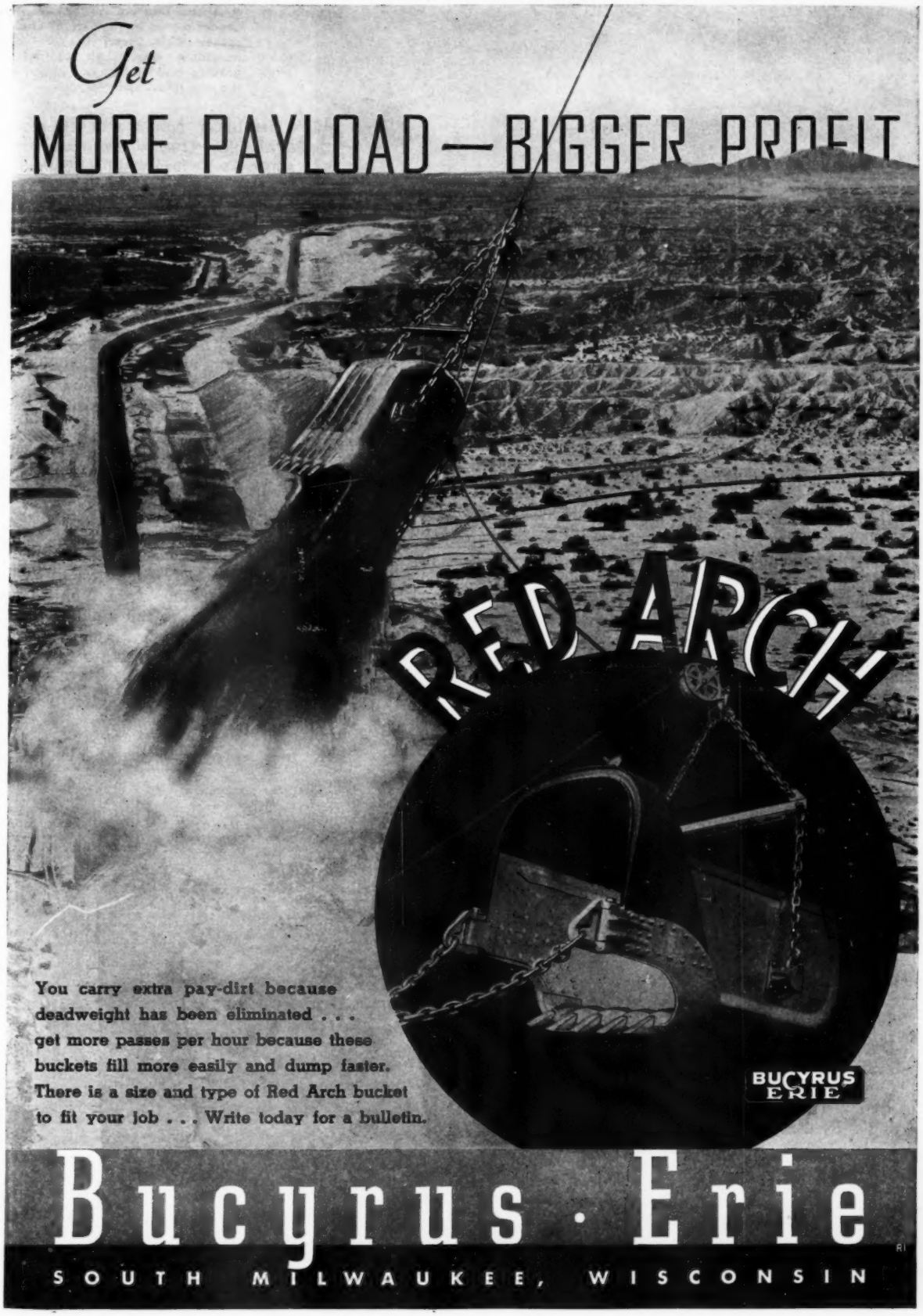
North Dakota

North Dakota's road program for 1939 is approximately the same as that of 1938. Of the $6,835,000 available for 1939 a total of $5,500,000 will be spent for construction, $1,200,000 for maintenance and the remaining $135,000 for other purposes.

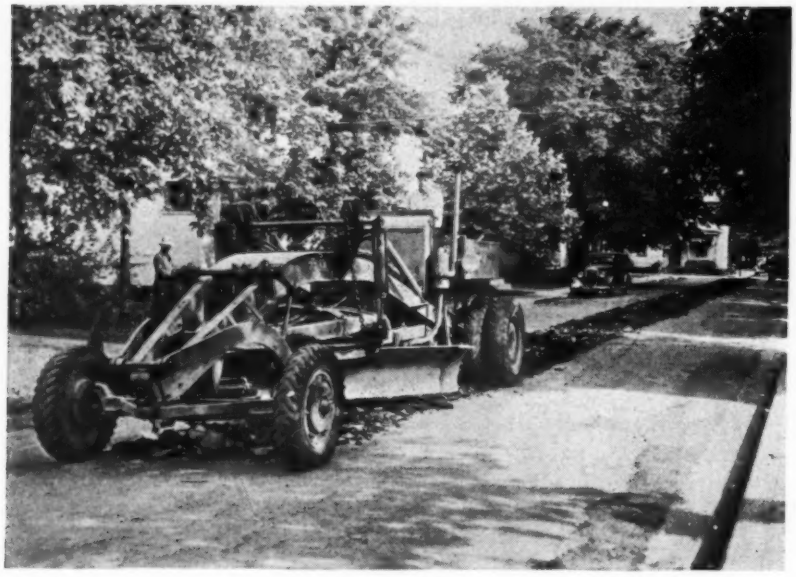
E. R. Tuskind, Engineer of Surveys and Plans, has divided the construction as follows:

Grading ---------- 214 miles
Surfacing—Base gravel or crushed stone ---- 271 miles
Oil Treatment ---------- 260 miles
Paving (low type) ---- 282 miles

In addition to this work 50 bridges will be constructed or widened at a cost of $900,000. Also, approximately 600,000 cubic yards of highway excavation


Get
MORE PAYLOAD—BIGGER PROFIT
RED ARCH
BUCYRUS ERIE
You carry extra pay-dirt because deadweight has been eliminated . . . get more passes per hour because these buckets fill more easily and dump faster. There is a size and type of Red Arch bucket to fit your job . . . Write today for a bulletin.
Bucyrus · Erie
SOUTH MILWAUKEE, WISCONSIN

For your convenience in writing to Bucyrus-Erie Co., you will find a card bound in this issue.



• Austin-Western 77Sr. Motor Grader owned by the City of Chillicothe, Ohio, scarifying an old macadam street. All scarifying, grading and mixing is handled by the one machine.

work will be carried over from 1938.

Highway funds will be obtained as follows: Federal Aid $2,500,000; PWA $540,000; State Gas Tax, Vehicle Licenses and other $3,795,000. None of the 1938 highway fund was diverted to other uses.

Ohio

Federal Aid (including FAS and FAGC funds) amounting to $4,968,000 will increase the Ohio highway fund for 1939 to approximately $20,000,000. Roughly, $11,000,000 of this amount will be used for maintenance and the remaining $9,000,000 will be devoted to construction.

In addition to the work mentioned above, approximately 500,000 yards of highway excavation in connection with paving projects awarded in 1938 will be completed in 1939 at a cost of $200,000.

Due to the fact that a new administration will assume office in January it is impossible to forecast how the construction funds will be divided.

No highway funds were diverted in Ohio during 1938.

Oklahoma

A 12% increase over 1938 expenditures is in view for Oklahoma where $16,640,000 will be used on the highways. Of this total $7,400,000 is to be used for construction; $3,250,000 for maintenance, and $5,990,000 for other purposes.

Construction funds will be used for the following work:

	Miles	Amount
Grading & Drainage	190	$1,900,000
Surfacing		
Gravel or crushed stone	185	320,000
Paving, high type	40	1,540,000
Paving, low type	100	950,000
Bridges	(69)	1,300,000
Grade Crossings	*	1,390,000

*13 crossing separations; 95 crossings protected.

• Johnson Dutchmill Bulk Cement Plant used by R. R. Ryan Construction Company on a road job at Anadarko, Oklahoma.

Highway funds will be made available from the following sources: Federal Aid $4,640,000; State Gas Tax $10,000,000; Vehicle License Fees and other $2,000,000.

Oregon

The Oregon highway fund of $12,825,000 will be divided three ways with $5,180,000 being used for construction, $3,660,000 for maintenance and $4,985,000 for other purposes such as bonds, surveys, etc.

The total highway fund will be available from the following sources:

Federal Aid	$2,945,000
PWA Grants	600,000
State Gas Tax	9,850,000
Vehicle Licenses, etc.	880,000

The $880,000 from Vehicle Licenses, etc., is the amount available for highway use after deducting $2,073,000 to counties and $348,000 to the State Police.

Construction funds will be used in this way:

	Miles	Amount	Quantities Required
Grading	130	$2,460,000	5,000,000 yds.
Surfacing—Gravel or crushed stone	170	1,160,000	900,000 tons
Oil Treatment	200	750,000	10,000 tons
Paving, high type	3	100,000	40,000 sq. yds.
Paving, low type	12	100,000	145,000 sq. yds.
Bridges (No.)	11	600,000	2,650 lin. ft.

• Berke Brothers of Portland, Oregon, are the owners of this Gardner-Denver Compressor working on a highway job in the Cascade Mountains about 50 miles southeast of Albany, Oregon.

All figures given above include work awarded in 1938 or before that will be carried over into 1939.

Pennsylvania

Available Federal Aid for Pennsylvania during the fiscal year 1939 totals $9,176,948. Of this amount, however, $6,350,084 will have to be matched by the state if they desire to make use of the allotment. Of the $6,350,084 allotted $5,291,737 is for use on the Federal Aid highway system and the remaining $1,058,347 for use on secondary or feeder roads.

Also available, and not requiring matching by the state, is a federal fund of $2,826,864 for grade crossing elimination.

Rhode Island

A state appropriation of $2,385,000 combined with a Federal Aid fund of $990,000 will give the state of Rhode Island a total of $3,375,000 to be spent on highways during 1939. In addition to this, 47,213 yards of highway excavation awarded during 1938 will be completed at a cost of $12,430.70.

H. C. Thierfelder, Deputy Chief Division of Roads and Bridges, sends the information that the total fund will be divided in the following manner:

Construction ---------$2,112,000

15 Load-Luggers 70 Buckets — one order

One simple demonstration will convince the most skeptical prospect that our cost cutting claims are sound . . . that the Brooks Load-Lugger is America's most effective . . . most versatile equipment for hauling and dumping any material, where loading is done by hand. When one Load-Lugger and four to eight Load-Lugger Buckets can replace several trucks, that's cost-cutting! Savings in operating cost alone pay for the Load-Lugger quickly. Write for "The complete Load-Lugger Story now."

BROOKS EQUIPMENT & MFG. CO.

74 Davenport Road, Knoxville, Tenn.

ROEBLING
WIRE . Wire Rope . Welding Wire . Flat Wire . Bare and Insulated Wires and Cables . Wire Netting and Cloth. John A. Roebling's Sons Co., Trenton, New Jersey.
Branches in Principal Cities
The pacemaker in wire rope development

For your convenience in writing to the advertisers on this page, you will find a card bound in this issue.

Maintenance	927,000
Other	336,000
TOTAL	$3,375,000

Lack of a complete construction program for the year makes it impossible to state how the construction fund will be divided among the different types of work.

South Carolina

The two year program which was put into use in South Carolina July 1, 1937 will not expire until June 30, 1939. Remaining funds not contracted for during the 1937-39 span total $6,000,000.

On July 1, 1939 South Carolina will embark on another two year program which was approved by the Commission in October. The total fund brought forward for use during the next program is $15,850,225.94. This amount includes a $100,000 allotment for the Statewide Planning Survey.

Since the adoption of the two year program in 1937 the Commission has from time to time approved additional construction projects in the various counties with the understanding that all such projects would be included in, or considered as a part of, the next two year construction program. Accordingly, all projects authorized or approved by the Commission since the adoption of the program in 1937 are included in the proposed $15,850,225.94 program for 1939-41.

• The Burrell Construction & Supply Company operates this 4 cubic yard Sterling Model HC100 for hauling building and maintaining materials for highways in and around New Kensington, Pennsylvania. This truck has 12 forward and 3 reverse speeds.

South Dakota

Only a small increase in highway funds is scheduled in South Dakota where a total of $7,500,000 is to be spent during 1939. Of this total $4,700,000 will be used on construction work and $2,400,000 will be devoted to maintenance. The remaining $400,000 is scheduled for other uses such as overhead, etc.

In addition to the work mentioned above, 1,500,000 yards of highway excavation awarded in 1938 or before will be completed at a cost of $175,000. There was no diversion of highway funds during 1938.

Construction funds are expected to be divided in this manner:

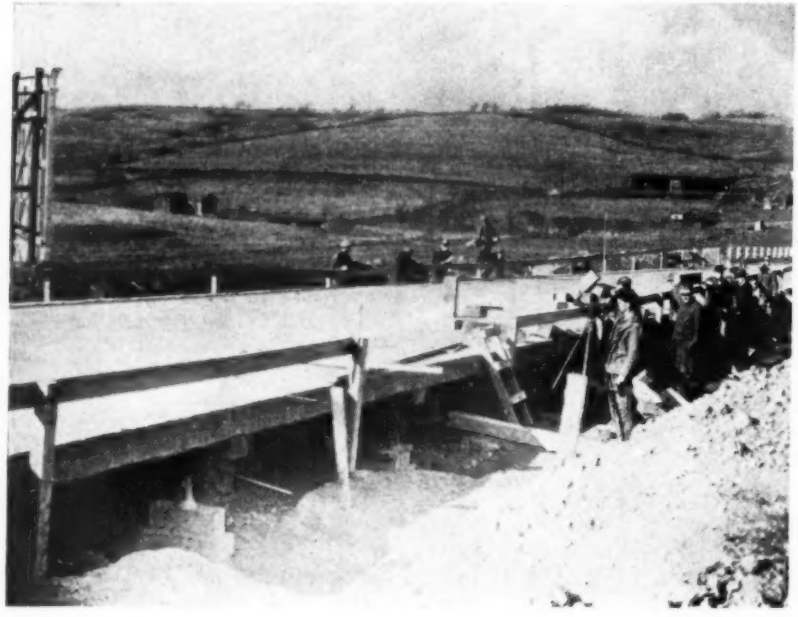
	Miles	Amount
Grading	300	$1,100,000
Surfacing—Gravel or Crushed Stone	50	70,000
Oil Treatment	350	2,600,000
Paving, High Type	25	700,000
Bridges (number)	30	230,000

Federal Aid funds are available to the extent of $2,700,000, of which all but $700,000 is being matched 50-50 by the state which will receive $4,000,000 from the State Gas Tax and $800,000 from License Fees and other sources.

Tennessee

During 1939 Tennessee will have available for construction

• Simplex Shoring Jacks and Ball Bearing Screw Jacks are being used by the Pennsylvania State Highway Department to raise a considerable length of pavement which had settled.



THEY GET *FIRST* CRACK AT THE BIG JOBS!

CONSTRUCTION-MEN, nowadays, aren't putting any faith in the old saying: "a bad beginning makes a good ending." On big jobs especially, they *start* right so they'll *end* right—take their *first* crack with "Caterpillar" Diesel power!

Tionesta Dam, in Pennsylvania, got under way on that basis . . . and is proceeding toward a good ending. Faced with moving more than 2¼ million yards of earth and rock, Grove-Lundin—of Minneapolis, Minnesota—put "Caterpillar" Diesels to work!

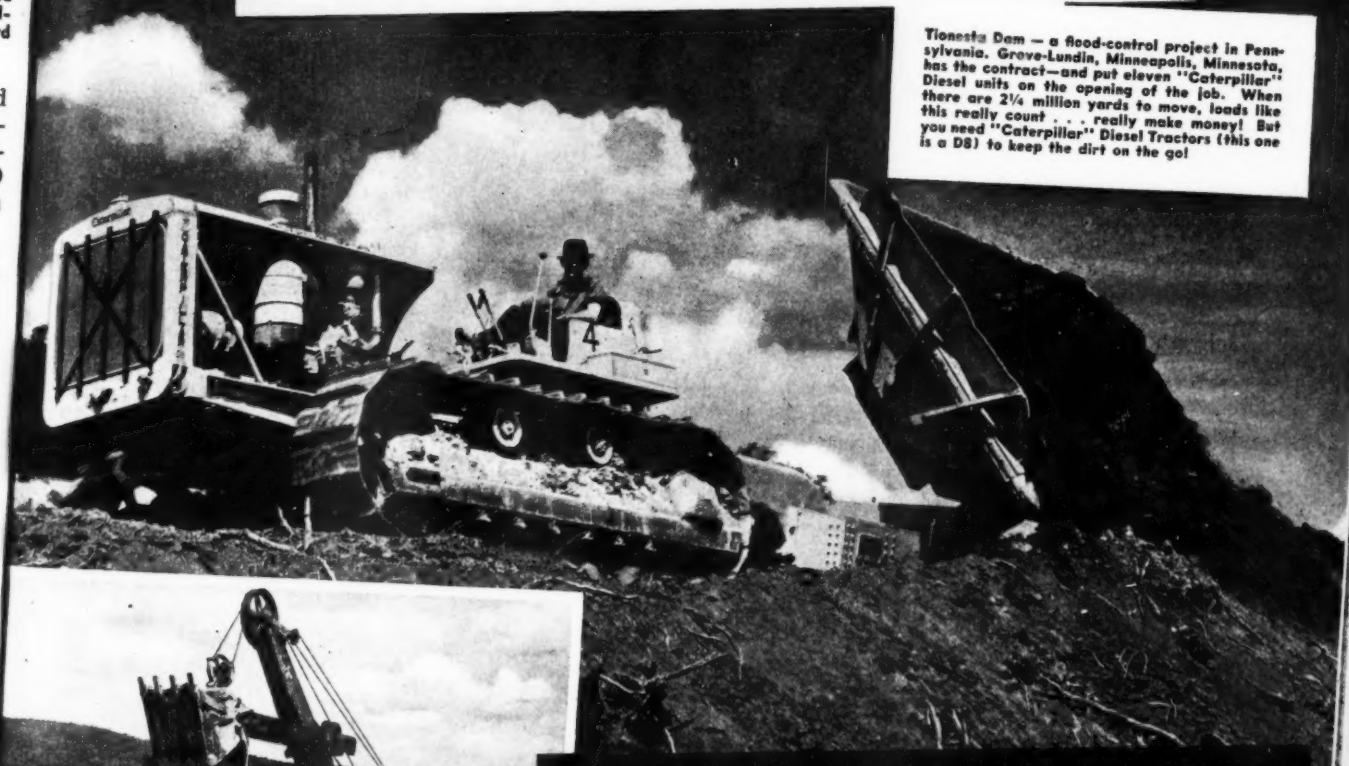
Here is the kind of dependability that sees a job through from start to finish. For "Caterpillar" Diesels are built with punishing loads and punishing hours in mind . . . built to last . . . built to *earn you a handsome profit* on your investment.

Yet there is something more to this equipment than the saving of time and money on repairs—and the spreading of its first cost over a long, useful life.

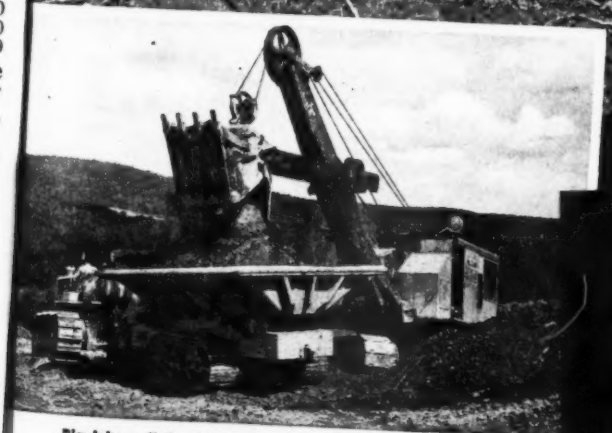
Fuel-economy, alone, is reason enough to put "Caterpillar" Diesels to work. But on top of that, you get a particular ability—tremendous power and positive traction that make you independent of weather conditions—to conquer the toughest jobs!

See your nearest "Caterpillar" dealer, and let him help you forecast the *money-making* possibilities in a "Caterpillar" Diesel-powered operation!

CATERPILLAR TRACTOR CO., PEORIA, ILL.



Tionesta Dam—a flood-control project in Pennsylvania. Grove-Lundin, Minneapolis, Minnesota, has the contract—and put eleven "Caterpillar" Diesel units on the opening of the job. When there are 2¼ million yards to move, loads like this really count . . . really make money! But you need "Caterpillar" Diesel Tractors (this one is a D8) to keep the dirt on the go!



Big jobs call for big loads—and here is one almost ready to go away! The Bucyrus-Erie shovel is powered by a "Caterpillar" Diesel Engine. The wagon is a 14-yard Athey. The tractor is a "Caterpillar" Diesel D8.

CATERPILLAR DIESEL POWER

REG. U.S. PAT. OFF.

DIESEL ENGINES • TRACK-TYPE TRACTORS • ROAD MACHINERY

purposes $2,600,000 regular Federal Aid, which, when matched by State Funds, will amount to $5,200,000. This money will be expended on concrete pavement, bridges, grading, and drainage and asphalt work in proportions of about 35, 30, 20 and 15 per cent, respectively.

In addition, there will be available an extra half million dollars of Federal Funds for Secondary or rural road construction, which usually consists of grading and drainage, with occasional small bridges and applications of surfacing stone.

Another 100% grant from the Federal Government for Grade Separation projects will amount to $933,000. This will be used practically in its entirety for bridge construction, with a very small amount being used for paving and grading.

Maintenance funds to be expended during 1939, and which are derived from a portion of the automobile registration fees, will amount to approximately $2,600,000.

Texas

E. J. Amey, Administrative Assistant, reports that due to the size of the state of Texas and the large amount of work being carried on it is impossible to report fully the 1939 Texas highway expenditures before March 1.

One of the Model 6-37 Linn Tractors with rock bodies owned and operated by U. S. Bureau of Public Roads on highway construction in Great Smoky Mountain National Park near Gatlinburg, Tennessee. June, 1938

The fiscal year which began September 1, 1938 and which will close August 31, 1939, will, however, include the following projects which were previously approved but have not yet been placed under contract:

		Miles
77	Grading and small drainage structures	315.9
56	Grading, drainage and surfacing projects	332.5
51	Pavement projects	385.3
49	Large structures	----

Projects active on August 31, which have carried over into the 1939 fiscal year are:

Type	Miles	Cost
Landscape	----	$ 44,932.95
Grading and small structures	450.94	5,592,024.94
Surfacing (gravel, etc.)	410.41	4,203,202.58
Surfacing (asphalt)	577.81	4,228,775.61
Concrete	238.06	3,467,731.37
Highway planning survey	----	1,382,753.68
Highway protecting devices	----	285,008.44
Railroad relocation	----	54,584.53
Large bridges	----	6,515,318.13
Underpasses and overpasses	----	676,524.97
Total		$26,450,857.20

Utah

The estimated 1939 highway fund for Utah will be approximately 10% below that of 1938. The available fund of $5,500,000 will be divided in the following way:

Construction	$3,200,000
Maintenance	1,500,000
Other	800,000

Sources from which funds will be obtained are the State Gas Tax $3,500,000 and Federal Aid $2,000,000.

W. L. Anderson, Chief Draftsman, estimates the division of the construction fund in this way:

• Two "boys," as the native workers are called, employed by the Natal Provincial Roads Department in South Africa are here busily engaged with a Sullivan Rock Drill.

	Miles	Amount	Quantities Required
Grading	150	$1,500,000	3,000,000 yds.
Surfacing—Gravel or crushed stone	150	700,000	1,600,000 tons
Oil Treatment	150	500,000	
Paving	6	300,000	150,000 sq. yds.
Bridges (No.)	10	200,000	

Highway excavation awarded in 1938 or before totaling to 500,000 yards will be carried over into 1939. This work will amount to $150,000 and will be in addition to the above program.

Vermont

Unless the Legislature, which meets in January, makes a number of changes, Vermont highway funds will total approximately $1,975,000. Expected Federal Aid will be received under the following divisions:

Regular Fed. Aid ------$609,375
Secondary Roads ------ 121,875
Grade Crossings ------- 243,750

State Funds, received from Vehicle License Fees and the State Gas Tax, amounting to approximately $1,000,000 will be used for highway construction if present laws are not changed by the Legislature. There was no diversion of highway funds in Vermont in 1938, however.

It is estimated that about 400,000 yards of excavation awarded in 1938 or before will be carried over into 1939. This will be in addition to the above.

• This Model SO Allis-Chalmers Tractor owned by Adams County, Washington is equipped with a Cyclone Air Cleaner.

Virginia

The Virginia highway fund for 1939 shows an increase of $2,634,687.33 over the total spent in 1938. Division of the 1939 fund which totals $28,514,684 will be in the following manner:

Construction (primary system)	$11,962,713.68
Maintenance (primary system)	2,322,180.74
Maintenance (secondary system)	2,867,571.34
Improvements (primary system)	3,677,319.26
Improvements (secondary system)	4,632,428.66
City Streets	500,000.00
Other	2,551,970.32
TOTAL	28,514,684.00

Highway funds will be available from the following sources: State Gas Tax $17,800,000; Vehicle License Fees and other $7,-

Here is a master filter . . . . . that brings used oil back to life

The Bucyrus Oil Reclaimer by simple warming, washing, and filtering processes removes all the impurities from your used crankcase oil, leaving a rich, efficient lubricant that gives even better performance than the original oil. Lubricating engineers have agreed for years that only the weaker and unstable molecules — about 10 per cent of the oil — are broken down by the heat and friction of engine wear. The other 90 per cent, made up of the strongest particles of the original oil, can be easily and safely separated for re-use by the successful Bucyrus Oil Reclaimer. And at an average cost of about nine cents per gallon!

Electrically operated and semi-automatic, the unit can be operated by any truck driver, yard attendant, or shop employee in less than a half-hour a day.

Write TODAY for the complete story of the Bucyrus Oil Reclaimer. Every one of our Reclaimer owners is more than satisfied.

T-20

BUCYRUS - ERIE
SOUTH MILWAUKEE, WISCONSIN, U. S. A.

For your convenience in writing to Bucyrus-Erie Co., you will find a card bound in this issue.

055,750; and Federal Aid $3,658,-934.

There was no diversion of highway funds in Virginia during 1938.

Washington

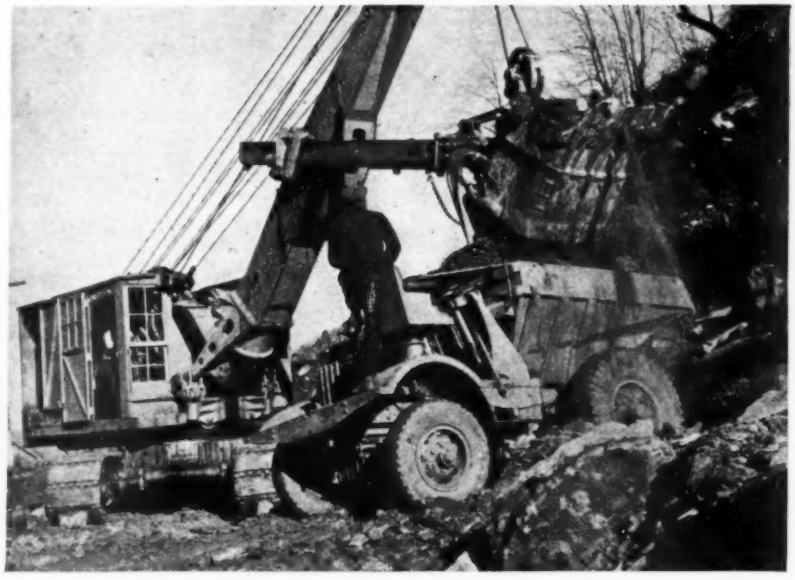
Total funds available for highway work in Washington during 1939 amount to $14,868,000 (this includes contracts carried over from 1938). Of this amount $10,-401,000 will be spent on construction, $3,600,000 for maintenance and $867,000 for other purposes. This is an increase of one per cent over the budgeted total for 1938.

Sources from which the money is available are as follows: Federal Aid $2,357,000; State Gas Tax and Motor Vehicle Funds $11,055,000; other sources $1,-456,000. All of these amounts include the funds carried over from 1938.

According to L. V. Murrow, Director of Highways, the 1939 construction funds will be divided approximately as follows:

Grading and Surfacing	52%
Cement Concrete Pavement	12%
Bituminous Surfaces	13%
Miscellaneous	4%
Bridges	15%
Grade Separations	4%

In addition to the work mentioned above, approximately $1,-218,000 of highway excavation work awarded in 1938 will be carried over into 1939.



• A Koehring Dumptor and shovel, owned by Brown, Murphy and Wright, operating on a highway job near Princeton, West Virginia.

West Virginia

A slight decrease in highway expenditures is expected in West Virginia during 1939 where State Funds, raised through the sale of bonds, amount to $12,462,000. Federal Funds totalling $3,438,-000 will increase the fund to $15,-900,000.

The highway fund will be divided with $9,300,000 devoted to construction, $5,800,000 to maintenance and $800,000 to miscellaneous purposes.

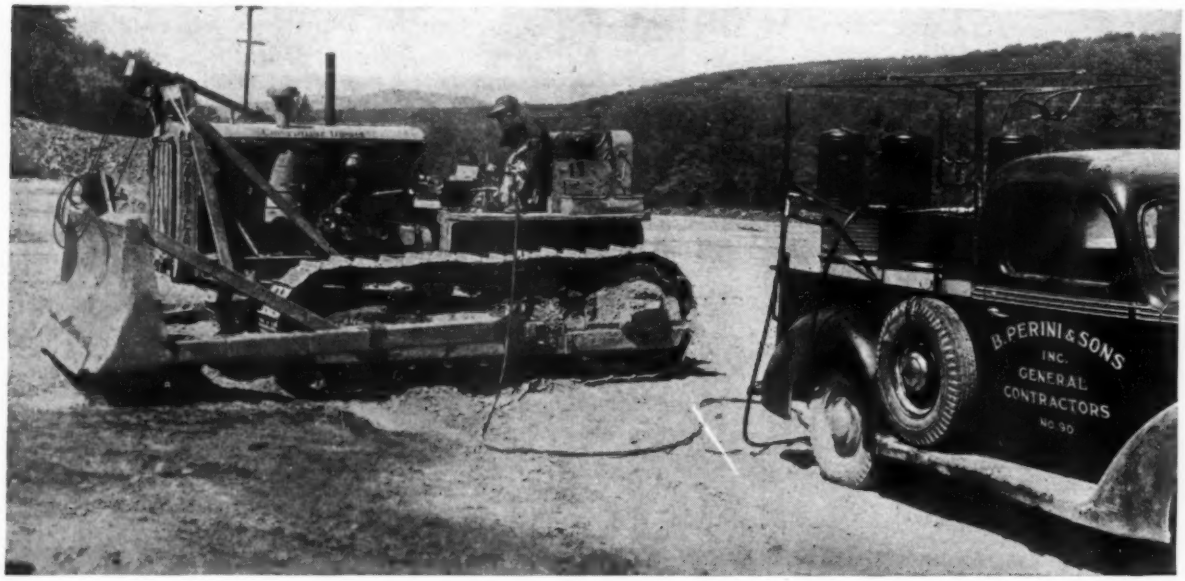
Construction funds will be divided in the following way:

	Miles	Amount
Grading	150	$3,750,000
Surfacing		
Gravel or crushed stone	50	600,000
Oil treatment	300	750,000
Paving (high type)	60	2,000,000
Paving (low type)	300	950,000
Bridges	(30)	1,250,000

Approximately 200,000 yards of highway excavation begun during 1938 or before will be carried over into 1939 in addition to the above work.

No highway funds were di-

• This Alemite Portable Service Station is being used to service a tractor right at the scene of construction.



verted in West Virginia during 1938.

Wisconsin

The state of Wisconsin expects a greater amount of hard surfacing in 1939 and a considerable reduction in the amount of grading. It is expected that the 1939 fund will be approximately $2,000,000 below the 1938 expenditures which were as follows:

Construction	$13,000,000
Maintenance	5,500,000
Total	$18,500,000

The 1938 construction funds were divided thus:

310 miles of grading $3,640,000
245 miles of gravel or crushed stone surfacing, $1,587,000
480 miles of oil treatment, $710,000
90 miles of concrete paving, $2,462,000
25 miles of bituminous pavement, $203,000
Structures, $2,917,000
Miscellaneous, $600,000

The 1938 fund which was 11% below the amount spent during 1937 was obtained from the following sources: Federal Funds $4,970,000; State Gas Tax and Vehicle License Fees $11,330,000; County Bonds or Tax Funds $2,200,000.

Wyoming

A decrease of 30% gives Wyoming a total of $4,000,000 to be used on highways during 1939. Of this amount 59% will be obtained from state funds and 41% will be received from Federal Aid sources.

The highway fund will be divided three ways with $2,850,000 being used for construction, $850,000 for maintenance and $300,000 for other purposes.

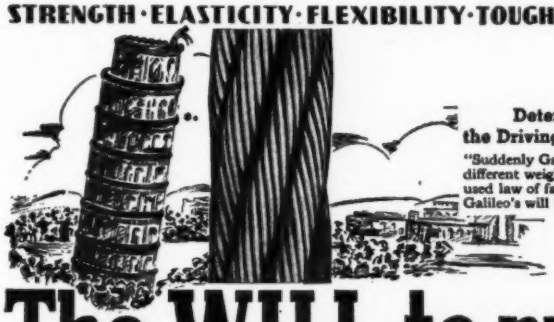
C. F. Seifreid, Superintendent, State Highway Department, signifies that the construction funds will be used on 150 miles of grading, 50 miles of surfacing with gravel or crushed stone, 60 miles of oil treatment, and 10 bridges.

In addition to the above, 500,000 yards of highway excavation awarded during 1938 or before will be carried over into the 1939 program.

No highway funds were diverted in Wyoming during 1938.

• This Edelblute Anchor Gear and Wheel Puller is removing a 6-foot wheel from a steam roller on a highway job in Clearfield County, Pennsylvania.

STRENGTH · ELASTICITY · FLEXIBILITY · TOUGHNESS · DURABILITY



Determination is Still the Driving Force to Achievement

"Suddenly Galileo dropped the two shots of different weights and" . . . his idea, the daily used law of falling bodies, had been proved. Galileo's will to achieve had again won out.

The WILL to produce

"HERCULES" (Red Strand) Wire Rope is the result of the determination of an entire organization to produce a quality product. In our plant, office and among the Leschen men in the field, there is that satisfaction . . . . pride . . . . that each one has had a part in bringing to you a superior product.

Your experience in using "HERCULES" (Red Strand) will prove that we are justified in this pride . . . because, this Wire Rope will prove its superior quality to you . . . the result of our determination to make it do so.

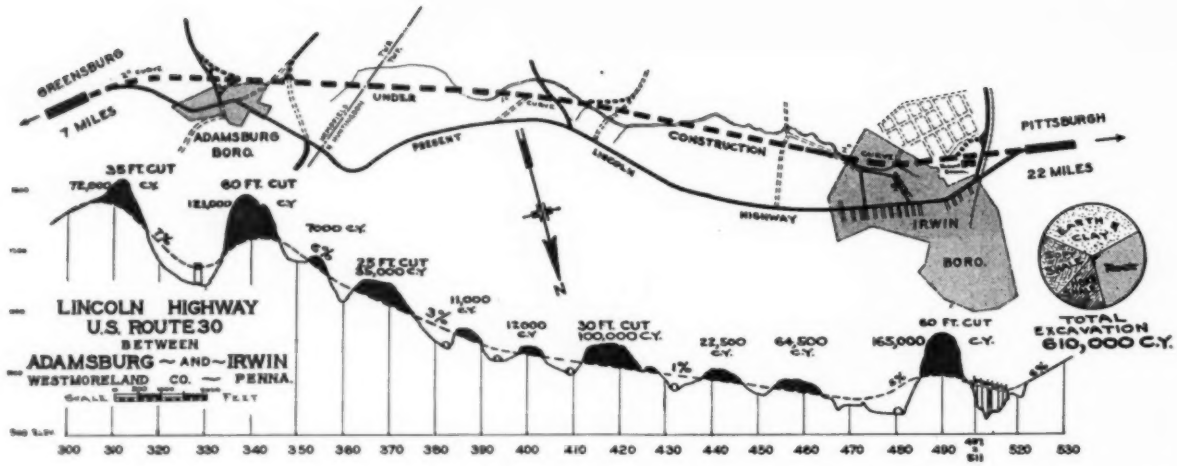
For Maximum Efficiency in Preformed Wire Rope, Use . . . PREFORMED "HERCULES" (Red Strand) WIRE ROPE. Available in both Round Strand and Flattened Strand Construction.

"HERCULES" RED-STRAND REG. U.S. PAT. OFF. WIRE ROPE

MADE ONLY BY
A. LESCHEN & SONS ROPE CO.
WIRE ROPE MAKERS · ESTABLISHED 1857
5909 KENNERLY AVENUE · · ST. LOUIS, MO.

NEW YORK . . . . . 87 to 90 West St.
CHICAGO . . . 810 W. Washington Blvd.
DENVER . . . . . 1554 Wazee St.
PORTLAND . . . . . 914 N. W. 14th Ave.
SAN FRANCISCO . . . . . 520 4th St.
SEATTLE . . . . . 3410 First Ave., South.

For your convenience in writing to A. Leschen & Sons Rope Co., you will find a card bound in this issue.



From Pittsburgh to Greensburg

(Continued from page 29)

Cross Secondary Highway

This "School House" cut will be the eastern approach to the 520-foot steel and concrete bridge in Irwin. The bridge crosses a secondary highway (to be joined with the new highway by a ramp), the branch line of the PRR, and the brewery feed houses and sheds lying next to the railroad tracks. With the bridge and cut, the highway at this point avoids grades steeper than the present 6% grade out of Irwin to the west, and becomes free from the serious traffic hazards mentioned above.

The bridge will require 1,393,000 pounds of fabricated structural steel, 396,000 pounds of plain steel bars, and 10,732 cubic yards of concrete. Excavation for the bridge includes 2400 cubic yards for the east abutment retaining wall, 766 yards for retaining wall, 1010 cubic yards for the west abutment, and 1335 cubic yards for the concrete pedestals.

Across the "Irwin Valley" the P&H 1-yard crane was digging foundations for the bridge and a stone's throw away the 10-B handled terra cotta for drainage.

• C. M. (Red) Rogers, Superintendent, (left) talks over plans with W. J. Brown. Grade Foreman Clarence Schaub lights a cigarette.

"All Over the Place"

The 10-B according to one of the grade foremen has been "all over the place . . . doing everything . . . and fooling us on the work it will turn out in a shift." Perhaps operator Jim Snyder is trying to show up his brother and the 43-B.

An attempt will be made to pour all of the concrete arches before winter weather shuts down the excavating operations. This will permit the completion of the fills around the arches early in the spring and make it possible to open the grade so that the concrete can be delivered in the shortest path from batch plant to job. It is expected that all grading will be done sometime next March.

The batch plant, so located on the side of a hill that gravity feed eliminates hoists or crane, is near the center of the job just a step or two off a secondary road and not more than a few feet from the new grade. (On the general plan illustrated herewith this road is represented by dotted lines at approximately Station 420). Bulk cement and aggregates are delivered by truck and dumped from above directly into Butler aggregate and Johnson cement bin-batchers. At least one more aggregate bin will be added for the slab pouring and the 7 Mack Trucks, equipped with Blaw-Knox Mixers, will be increased to about 15 when pouring the pavement. The truck-mixers are fed by gravity and the trucks load the cement on the lower level.

Trucks Use U. S. 30

At present the 9000 cubic yards of concrete required for the five concrete arches is being turned out as rapidly as it can be placed. Following this, the bridge foundations will be poured. Until all fills around the concrete arches are completed, trucks loaded with cement can use the present U. S. 30 if this route proves quicker.

Just east of the "batch plant" cut, a secondary highway from the south crosses the new grade. At approximately this point the western end of the new all-weather highway (being constructed on the roadbed of the abandoned South Penn Railroad by the Pennsylvania Turnpike Commission) will join the U. S. Highway 30. As a feeder to the new super-highway, this relocated section of The Lincoln Highway plays an important part.

Skilled Bridge Builders

The Brothers Wagman have long (since 1902) been known as skilled bridge builders in Pennsylvania. For the past year Partner Walter Shaull, formerly with H. W. Shaull & Sons, has been associated with the firm. Mr. Shaull is the firm's expert on ex-

• Top: With a roar the RD8 and 12-yard LeTourneau climb the 40% grade to the cut. Bottom: "Our parting shot . . . the sturdy little shovel seemed to be trying to get in a last few licks before the gathering dusk brought to a close another busy day."

cavating operations and the way he keeps his equipment going at top speed proves his capabilities. The contract, including paving, is scheduled to be finished in 200 working days. With Walter Shaull on guard over the excavating operations and George and Fred Wagman keeping keen eyes on arches, bridges, drainage and other problems, it isn't unlikely that they will be ready for other work before the end of July—meaning they will be ahead of schedule because inevitable delays will shut them down for short periods during the coming winter months.

Field Office at Lincoln Towers

The field office of G. A. and F. M. Wagman is located at Lincoln Towers just east of Adamsburg (postoffice Irwin, Pa.). Here M. S. Barkheimer, Office Engineer, supervises the office records for the contractor and answers a mighty busy telephone. In an adjacent room E. A. Campbell, Inspector, is in charge of the Pennsylvania Highway Commission office on the job.

Field inspection for the Highway Commission is in charge of S. E. Michael, reporting to the project engineer. Bud Wagman and George Wagman, Jr., sons of George, Sr., are field engineers.

Guy Rupp is the trucking contractor and Wm. Grimes is truck superintendent. At present approximately 21 trucks are in use. The trucks, all of which are of 5-ton capacity or over, are Internationals, Macks and Auto Cars.

As the day of gathering news and snapping action photographs of men and machines drew to a close, our parting shot was a view of the 10-B handling 24-inch drainage pipes a few feet from the western end of the contract. The sturdy little shovel seemed to be trying to get in a few last licks before the gathering dusk brought to a close another busy day.

Here Is a Bargain
in used excavating equipment

(taken from page 67)

BAY CITY MODEL 30, gasoline combination ½-yard shovel and 35' boom dragline. Hercules 6-cylinder 4¼"x4½" engine. Machine shop reconditioned. Available about 30 days. Located Milwaukee, Wis. Box 2202-SS

For other bargains in shovels, draglines, cranes, locomotives, trenchers, and miscellaneous contractors' equipment turn to pages 67 to 70.

The largest listing of Used Equipment offered by any Publication Serving the Excavating Industry.

HAYWARD BUCKETS

WON'T QUIT
OR CAUSE TIME OUT

A Hayward Bucket keeps the job going ahead on scheduled time. It won't quit or cause time out.

THE HAYWARD COMPANY
52-54 Church Street
New York, N. Y.

Modern Highways Replace Pack Trails Through Peru

(*Continued from page 25*)

tion and a sum of approximately four millions has been set aside for requirements.

As no account of the highways of Peru would be complete without a mention of the "Central Highway" from Callao through Lima, I offer here a brief outline of its most interesting points. Its construction has been the most difficult of all highway construction in Peru. The main section runs from Callao through Lima to Oroya, where it branches into three directions. One branch continues on eastward across the last range of the Andes mountains to Tarma and La Merced and then into the jungle that lies beyond. Another runs southward through Huancayo to Ayacucho, and will be extended later through Abancay to Cuzco. The third leads northward through Cerro de Pasco, where there are very extensive mining operations by American interests, to Huanuco and Tingo Maria, and will also be extended later to reach Pacalpa on the navigable section of the Ucayali river.

From a tourist's point of view the Central Highway is most fascinating, as, within ten miles or so from Lima, it rises from approximately sea level to slightly under 16,000 feet above sea level, or about 1500 feet above the highest peak in the United States. It is really a "highway above the clouds" and probably the highest highway in the world. In travelling this route you pass through Chosica, a winter resort for the people of Lima, which is just above the clouds where you can almost always enjoy the sunshine. Then the most amazing part of the highway unfolds in the stretch from this point to the Andean divide at Anticona pass, and which takes you through the famous "Infernillo" canyon, one of the most awe-inspiring gorges imaginable. The cliffs for more than half the distance rise almost vertically and confronted the engineers with the problem of determining the best route from where the highway was to enter the canyon to the point where it was to emerge some 1500 feet higher and only about a mile distant. They finally decided to build a series of spirals to cross and recross the river far below by bridges. In doing this the highway twice crosses under the bridge carrying the Central Railroad far overhead, extending from one dark tunnel hole on one side of the canyon to another on the other side. Cost figures on the construction of this highway give some idea of the difficulties encountered, as the first mile cost approximately only about one-eighth as much as any of the remaining miles which included the spiral ladder previously mentioned.

Travellers through Peru are mystified at the utter bareness of the country except in the irrigated valleys along the coast, until the effect of the Humboldt current is explained. This current of cold water, that has its source in the Antartic and continues in a general northerly direction along the coast of northern Chile and most of Peru, has been estimated at from 135 to 150 miles wide and moves at a speed of about fifteen miles a day. It provides the people along the coast with plenty of fish and provides the millions of birds, that really are a part of Peru, economically with their daily food. The inhabitants of this coastal section do not experience lightning or thunder and very seldom have any rain. The moisture that is elevated by action of the sun on the ocean's surface is carried to a high altitude and then usually reaches the eastern side of the Andes mountains before it is precipitated. Another effect is that the climate of the coastal cities does not vary greatly and that of Lima, the capitol, and Callao, the seaport, are on record as not varying over ten degrees.

As we learn of the wonderful work so far accomplished, we do not hesitate to applaud the work of the present administration with its very capable engineering staff, and feel sure that, given the opportunity, they will complete the work now started on schedule or before, and proceed to more conquests and problems for the advancement of a rich and prosperous country, Peru.

BUCYRUS-ERIE

Shovels — Draglines — Cranes — Clamshells — Dragshovels — Skimmers

Bullgraders — Bulldozers — Scrapers

BUCYRUS-ERIE COMPANY

Headquarters: SOUTH MILWAUKEE, WISCONSIN, U. S. A.
Works: South Milwaukee, Wis., Erie, Pa., Evansville, Ind.

ALABAMA, BIRMINGHAM: Bucyrus-Erie Company, 2212 Comer Building. Phone 3-0642.
MONTGOMERY: Ray-Ewbank Machinery Co., 101 Chandler St.
ALASKA: (See Washington, Seattle).
ARIZONA, PHOENIX: Arizona Tractor & Equipment Co., 1400 N. 19th St.
ARKANSAS, LITTLE ROCK: Lyons Machinery Company.
CALIFORNIA, LOS ANGELES: Crook Company, 2900 Santa Fe Avenue, Phone Kimball 5137.
SAN FRANCISCO: Bucyrus-Erie Company, 390 Bayshore Blvd. Phone Atwater 2341.
OAKLAND: Industrial Equipment Co., Outer Harbor.
COLORADO, DENVER: Ray Corson Machinery Co., 1646 Wazee Street.
CONNECTICUT, NEW HAVEN: The W. I. Clark Co., 1811 Dixwell Avenue.
GEORGIA, ATLANTA: W. C. Vines, 1143 Briarcliff Road, Phone Hemlock 8376.
ATLANTA: R. S. Armstrong & Bro. Co., 676 Marietta. Phone Jackson 2010.
IDAHO, BOISE: The Inter-Mountain Equipment Co., Broadway at Myrtle Street, Phone 171.
ILLINOIS, CHICAGO: Bucyrus-Erie Company, 1312 Bankers Bldg., 105 W. Adams Street, Phone Franklin 5321.
CHICAGO: Erby-Camlin Company, 8524 Vincennes St.
ROCKFORD: Erby-Camlin Company, 224 S. Main St.
INDIANA, INDIANAPOLIS: A. F. Deaney, 719-721 N. Pine St.
IOWA, CEDAR RAPIDS: James W. Bell, 916-16th N. E.
KANSAS, PITTSBURG: Bucyrus-Erie Company, 209 East 4th St., Phone 164.
KENTUCKY, LOUISVILLE: Brandeis Machinery & Supply Co., Brook & Warnock Sts., Phone Magnolia 6600.
MAINE, PORTLAND: Maine Truck-Tractor Co.
MARYLAND, BALTIMORE: Stuart M. Christhilf & Co., 205 Snow Bldg., Phone Calvert 4310.
MASSACHUSETTS, BOSTON: Bucyrus-Erie Company, 240 N. Beacon St., Phone Stadium 3152.
MICHIGAN, DETROIT: Abrams-Anderson Co., 10425 Northlawn Ave.
MINNESOTA, CROOKSTON: Wm. H. Ziegler Co., Inc., 122 So. Main St.
DULUTH: Wm. H. Ziegler Co., Inc., 304 Lake Ave. So., Phone Melrose 681.
MINNEAPOLIS: Wm. H. Ziegler Co., Inc., 2331 University Ave. S. E., Phone Gladstone 7971.
MISSISSIPPI, JACKSON: Mississippi Road Supply Co. Telephones: Long Distance 9906, Local 3676.
MISSOURI, KANSAS CITY: Bucyrus-Erie Company, 1007 Fairfax Bldg., Phone Harrison 4811.
ST. LOUIS: Bucyrus-Erie Co., 818 Olive St.—Suite 906, Telephone, Chestnut 1354.
MONTANA, BILLINGS: Connelly Machinery Co., 509 N. 27th Street.
GREAT FALLS: Connelly Machinery Co.
MISSOULA: Westmont Tractor & Equip. Co.
NEBRASKA, OMAHA: Cardinal Supply & Mfg. Co., Sunderland Bldg.
NEVADA, RENO: Howard Steiner Equip. Sales, East 4th Street (P. O. Box 471)
NEW JERSEY, ENGLEWOOD: Bucyrus-Erie Company, 214-216 South Dean Street, Phone 3-6727.
NEW MEXICO, ALBUQUERQUE: R. L. Harrison Co., Inc., 209 N. 4th Street.
NEW YORK, NEW YORK: Bucyrus-Erie Company, 30 Rockefeller Plaza, Room 3627, Phone Columbus 5-4395.
NEW YORK: Tractor & Equipment Corp., 355 Walton Ave., Phone Mott-Haven 9-5500.
SYRACUSE: Bucyrus-Erie Company, 303 Draper Ave., Phone 6-1078.
NORTH CAROLINA, GREENSBORO: E. F. Craven Company.
OHIO, CINCINNATI: Bodo-Finn Equip. Co., Inc., 1650 Central Avenue.
MENTOR: Earl Ives Equipment Co.
YOUNGSTOWN: Fetzer Equipment Co.
OREGON, PORTLAND: Clyde Equipment Co., 17th & Thurman Sts., Phone Broadway 5561.
PENNSYLVANIA, PHILADELPHIA: Bucyrus-Erie Company, 821 Commercial Trust Bldg., Phone Rittenhouse 4281.
PITTSBURGH: Bucyrus-Erie Co., 1502 Clark Bldg., Phone Atlantic 4815
TENNESSEE, KNOXVILLE: Brooks Equipment & Mfg. Co., 408-10 Davenport Rd
MEMPHIS: Road Builders Equipment Co., 635 Union Avenue.
TEXAS, DALLAS: F. W. Knable, 1212 Magnolia Bldg., Phone 2-2943.
DALLAS: F. C. Crane Co., 3120 Grand Ave., Phone 4-2181.
EL PASO: Tri-State Equipment Co., 500 E. Overland Ave.
PECOS: Tri-State Equipment Co.
VERMONT, BARRE: Reynolds & Son, Inc.
VIRGINIA, RICHMOND: Virginia Tractor Company, Inc., 1628 W. Main St.
WASHINGTON, SEATTLE: Clyde Equipment Company, 3410 First Ave., South
SEATTLE: Bucyrus-Erie Co., 3408 First Avenue South, Phone Maine 6424.
SEATTLE (for Alaska): Northern Commercial Co., 419 Colman Bldg.
WEST VIRGINIA, CLARKSBURG: General Equip. Co., Inc., 414 N. Fourth St.
HUNTINGTON: Chas. S. Porter Supply Co., 424 Fourth Ave.
WISCONSIN, MILWAUKEE: W. L. Hartley, 8021 Woodland Ave., Wauwatosa, Wis.

CANADA

BRITISH COLUMBIA, VANCOUVER: Finning Tractor and Equipment Co.
MANITOBA, WINNIPEG: Kipp-Kelly, Ltd., 68 Higgins Avenue.
ONTARIO, TORONTO: F. H. Hopkins & Co., Ltd., Commerce & Transportation Building.
QUEBEC, MONTREAL: F. H. Hopkins & Co., Ltd., 340 Canada Cement Bldg., Phillips Square, Phone Plateau 1186.

FOREIGN DISTRIBUTORS

ARGENTINE REPUBLIC: General Electric S. A. Buenos Aires, Rosario de Santa Fe, Tucuman, Cordoba, Mendoza, San Juan.
BRAZIL: International Machinery Company, Rio de Janeiro, Sao Paulo, Recife.
BOLIVIA: International Machinery Company, Oruro.
CHILE: International Machinery Company, Santiago, Antofagasta, Iquique.
CHINA: (exclusive of Manchuria) AND HONGKONG: Messrs. Arnhold & Co., Ltd., Shanghai.
COLOMBIA: International General Electric S. A., Barranquilla, Bogota, Medellin and Cali.
GUIANA—BRITISH: Booker Bros. McConnell & Co., Ltd., Georgetown, British Guiana.
HAITI, REPUBLIC OF: Anton Kneer, Port au Prince.
HAWAII: Theo. H. Davies & Co., Ltd., Honolulu.
HONDURAS: Mullen Tractor and Equipment Co., Inc., San Pedro Sula.
JAPAN: Mitsui & Co., Ltd., Tokio and principal cities of Japan.
MEXICO: Implementos Agricolas, S. A., Ave. Juarez No. 104A, Mexico, D. F.
PERU: International Machinery Co., Lima.
PHILIPPINE ISLANDS: Manila Machinery & Supply Co., Inc., Manila.
PUERTO RICO: West India Machinery & Supply Co., San Juan.
SALVADOR REPUB. EL: Benjamin Sol M., San Salvador.
TRINIDAD, DOMINICA AND THE WINDWARD ISLANDS: Neal & Massy Engineering Co., Ltd., Port of Spain, Trinidad.
URUGUAY: General Electric, S. A., Montevideo.
VENEZUELA: International General Electric S. A., Caracas, Maracaibo.
VIRGIN ISLANDS: West India Machinery & Supply Co., San Juan, Puerto Rico

For Bucyrus-Erie Tractor Equipment—Bulldozers, Bullgraders, Hydraulic and Cable Controlled Scrapers, See Your International TracTracTor Dealer.

RUSTON-BUCYRUS LIMITED

Headquarters and Works: LINCOLN, ENGLAND
London Office, Imperial House, 15, 17, 19, Kingsway, W. C. 2

AUSTRALIA: Ruston & Hornsby (Australia), Pty., Ltd., Melbourne, Sidney and Brisbane.
WESTERN AUSTRALIA: Messrs. Harris Scarfe & Sandovers, Ltd., Central Hay St.; P. O. B. 92, Perth.
AUSTRIA: "Garbo" Aktiengesellschaft fur Landwirtschaftliche Maschinen und Kraftafahrzeuge, Dresdnerstrasse, 27 Vienna.
BELGIUM: Messrs. Bergerat-Dutry, 21, Rue de la Senne, Brussels.
BRITISH ISLES:
SCOTLAND: Mr. L. Barnett, 200 Vincent St., Glasgow.
BRISTOL: Ruston & Hornsby, Ltd., Scottish Widow's Buildings, 28 Baldwin St., Bristol, 1.
MANCHESTER: Mr. G. Poore, 'Lindum', Hilton Rd., Bramhall, Cheshire.
BIRMINGHAM: Mr. J. H. Saville, 'Ardeevin', Tilehouse Greene Lane, Knowle, Warwickshire.
BULGARIA: Watkis & Ardash, No. 11, Rue Pr. Klementina, Sofia.
BURMA: William Jacks & Company, P. O. Box 83, 517 Merchant Street, Rangoon, Burma.
CZECHOSLOVAKIA: Felix Pick, Mosartova 2071, Prague XVI.
DENMARK: E. T. Grew, Raadmansgade 43, Copenhagen.
EGYPT: The Tractor Company of Egypt, S. A. E., P. O. Box 366, Cairo.
ESTHONIA: Mr. V. M. Laussen, Kooslkrantsi 3, Tallinn.
FEDERATED MALAY STATES: Harper-Gilfillan & Co., Ltd., P. O. Box 247, Kuala Lumpur, Selangor.
FIJI, TONGA, SAVAII & UPOLO: Morris, Hedstrom, Ltd., Suva, Fiji.
FINLAND: Aktiebolaget, Eskstroms, Maskinaffar, Oy, Helsingfors.
FRANCE: Messrs. Brunner & Marchand, 3 Rue de Stockholm, Paris 8e.
GREECE: Societe Financiere et Technique de Grece, S. A. Rue Metropole No. 10, Athens.
HOLLAND: Messrs. Wynmalen & Hausmann, Postbus 1216, Rotterdam.
HUNGARY: Internationale Maschinenhandels, V., Vilmos csasmar-ut 32, Budapest.
INDIA (EASTERN): McLeod & Co., P. O. Box 78, Calcutta.
INDIA (WESTERN): Greaves Cotton & Co., Ltd., P. O. Box 91, Bombay.
IRISH FREE STATE & NORTHERN IRELAND: Ruston & Hornsby, Ltd., Dublin.
ITALY: Soc. An. Ing. F. Fiorentini & C., Via Tiburtina N. 364, Casela Postale 1159, Roma (38).
KENYA, UGANDA AND TANGANYIKA: Messrs. Gailey & Roberts, Limited. Nairobi, Kenya Colony, British East Africa.
LATVIA: Argonaute—E. Meyer, Terbatas iela 9/11, Riga.
NETHERLANDS EAST INDIES: Lindeteves-Stokvis, J. A. Brouwersplein 20, Amsterdam, Holland.
NEW ZEALAND: John Burns & Company, Ltd., Customs Street, East, Auckland.
NORWAY: Maskin A/S Fay & Brinck, P. O. Box 653, Oslo.
PALESTINE: Mr. A. Koch, Engineering Works & Supplies, P. O. Box 707, Jerusalem.
POLAND: Eugene Bojemski, Wandy 42, App. 9, Katowice.
PORTUGAL: Monteiro Gomes, Limitada, Rua Cascais, 47 Alcantara, Lisboa.
SIAM: Bangkok Dock Co., Bangkok.
SPAIN: Messrs. Gumersindo Garcia, Calle Serrano 59, Madrid.
STRAITS SETTLEMENTS, SARAWAK AND BRITISH NORTH BORNEO: Messrs. The United Engineers, Ltd., Singapore and 87 Bishop Street, Penang.
SUDAN: Sudan Mercantile Company, Limited, P. O. Box 97, Khartoum.
SWEDEN: Tornborg & Lundbergha, A. B., Norra Bantorget 22 Stockholm.
SWITZERLAND: U. Ammann Maschinenfabrik, A. G. Langenthal.
TURKEY: Said Akinci ve Said Dormen, Galata, Bozkurt-Jeneral Han No. 4-5-6, Istanbul.
UNION OF SOUTH AFRICA: Hubert Davies & Co., Ltd., P. O. Box 1386, Johannesburg, Transvaal.
YUGOSLAVIA: Messrs. H. & Ch. Veegeli, P. O. Box 56, Pariska, U. L. 7, Belgrade.

Local distributors in principal countries on the following continents:
Europe, Africa, Asia (except Japan and China), Australasia and New Zealand.

BUCYRUS-MONIGHAN CO.

Works: Chicago, Ill.

Products sold exclusively by Bucyrus-Erie Company, Ruston-Bucyrus Limited and their distributors.

BUCYRUS ERIE

Book reviews

A 4-page illustrated leaflet, just published by Westinghouse Electric & Manufacturing Company, describes the motors designed to meet the exacting electrical and mechanical requirements of such applications as cranes, hoists, coke pushers, larry cars, turntables, steel-mill auxiliaries, bascule, lift and swing bridges, and rotary car dumpers. A copy can be had from the company.

A copy of "Job-Test Evidence," the latest of Cummins Engine Company's literature, is available without charge to interested parties in the dump truck and contracting fields.

Capacities, specifications and mechanical features of the largest "Caterpillar" Diesel Tractor have been grouped together in a new booklet, Form 4876.

Printed in two colors, the book is illustrated with pictures showing action views of the Diesel D8 tractor on the job, as well as cutaway views of the engine, fuel system, transmission, final drive, etc.

Readers may obtain their copy by writing Caterpillar Tractor Co., Peoria, Illinois.

SNOW BUCKETS

Big capacity combined with speed and strength: a bucket with which to handle yardage—and AT A PROFIT.

QUICK DELIVERY—wire, phone or write for prices.

HAISS

George Haiss Mfg. Co., Inc., 144th St. & Park Ave., New York

Who, for over 40 years, have created and sold none but equipment of demonstrable superiority in design and manufacture.

Portable Conveyors — Revolving Screens

The Johns Conveyor Division of the Osborn Manufacturing Company has put out a booklet describing "the pipeline that moves." Drawings in three colors plus photographic field shots illustrate the 8 pages of descriptive copy. Write for your copy.

The fifth edition of Trade Standards adopted by the Compressed Air Institute can be obtained at the price of $1.00 by writing to Compressed Air Institute, 90 West Street, New York, New York.

A new 16-page, 2-color Bulletin No. 154, just published by Ransome Concrete Machinery Company, Dunellen, New Jersey, graphically illustrates the 21 star features, the mixing action, diagrams, etc., of the new and complete line of Ransome 7-S and 10-S Model "V" Mixers. A copy will be sent to anyone writing to that company.

Copies of an attractive new 16-page bulletin on Armco Structural Steel Plate Linings for tunnels, shafts, caissons and conduits are being offered to engineers and contractors by Ingot Iron Railway Products Company, Middletown, Ohio. The booklet illustrates the uses of Armco plate linings and presents helpful design information.

Armco plate linings are scientifically designed to use less steel, according to the manufacturers. Data compiled from field tests show Armco plates are 890% stronger than flat plates.

Sullivan Machinery Company has recently issued a new catalog describing their large semi-portable air compressor, the WN-102. This piece of literature shows complete specifications of the three sizes available, and also many photographs of field views. Copies can be secured from the manufacturer at Michigan City, Indiana.

The Koppel Division of Pressed Steel Car Company, Inc., has just issued a new informative sixteen page bulletin describing their line of Industrial Railway Cars and accessory equipment. Copies are available by writing the company direct—at their general offices—Grant Building, Pittsburgh.

The Broderick & Bascom Rope Company announced the publication of a new wire rope catalog, devoted especially to wire rope for the contracting trade. This booklet contains not only the usual price list but also has many pages of data as to stresses in suspended cables, stresses in hoist and incline ropes, and specific recommendations as to grades and constructions of rope for various types of power shovels, crane and other equipment; as well as a paragraph on the causes necessitating the premature discard of rope. Copies may be obtained from the main office at St. Louis, Missouri, or branches.

The American Hoist and Derrick Company, St. Paul, Minnesota, is ready to send you copies of the new bulletins describing mouldboard and wing-type snow plows.

Including for the first time a table on the effect of load and speed on tire service, with percentages of recommended maximum loads at maximum sustained speeds to obtain normal tire service, The B. F. Goodrich Company, Akron, Ohio, has just published an Operators Handbook on truck, bus and farm and industrial tractor tires. The 66-page volume contains statistical material of interest to operators of commercial vehicles, on highways, farm and factory. Description and specifications of the company's products for these varied services are included. Copies can be obtained upon request to the company.

A large two-colored broadside featuring the new Ransome 27-E Pavers with Hydraulic control and other late features, has just been issued by the Ransome Concrete Machinery Co., Dunellen, New Jersey. A copy will be sent to anyone writing that company and mentioning this paper. It is entitled "The Pioneer Blazes a New Trail."

A new 64-page catalog describing the new Screw Conveyor line manufactured by the Chain Belt Company of Milwaukee, Wisconsin, has just been produced. This catalog contains information on screw conveyor installations, selection of screw conveyors, capacity charts, specifications, etc. It also contains complete cataloging of REX cast and REX Salem type elevator buckets. Your copy can be had from the manufacturers.

Two new bulletins outlining "how" measures for combating industrial disease and for guarding employee health are now being distributed by Air Hygiene Foundation to its member companies. One deals with "Determination of Lead," a metal which alone or in combination constitutes a "triple threat" to health of workmen exposed as it and its compounds can be inhaled, swallowed, or absorbed through the skin. The other publication is a guide for appraising dust risks. Copies may be obtained by writing to the Air Hygiene Foundation of America, Inc., 440 Fifth Avenue, Pittsburgh, Pennsylvania.

Trade notes

The Ransome Concrete Machinery Company, builders of concrete and industrial mixers of all types and sizes, have just closed with the Bode-Finn Equipment Company, Inc., 1654 Central

For your convenience in writing to George Haiss Mfg. Co., Inc., you will find a card bound in this issue.

Avenue, Cincinnati, to represent them in that territory where they will handle the complete Ransome line.

W. O. Bates, Jr., who recently was transferred from the San Leandro, California, offices of Caterpillar Tractor Company, to become head of the Patent Department at Peoria, has been appointed a Vice-President of the company.

Bruce P. Smith, who has a wide acquaintance in the coal stripping, iron ore, construction and industrial fields, has just recently been appointed Vice President in Charge of Sales for the Dart Truck Company, Kansas City, Missouri. He will make his headquarters in Chicago, retaining the same offices at 520 North Michigan Avenue.

Everett Moses has been appointed as Northeastern Representative for the Brooks Equipment & Mfg. Company, of Knoxville, Tennessee. Mr. Moses will specialize on the sale of "Brooks Load Luggers," for the present. G. V. Aldridge has joined the Brooks Equipment & Mfg. Company of Knoxville, Tennessee. Mr. Aldridge will specialize in the sales of the "Brooks Load Lugger" in the Southwest and on the West Coast where he is already well known among the equipment distributors and contractors.

Hercules Powder Company announces the appointment of Tom Brown as manager of the contractors' division of the explosives department, succeeding J. J. Kelleher, who resigned November 11. Mr. Brown, connected with the explosives industry since 1911, is widely known to the contractors of this country.

FOR SALE

RATES: 60c per line—minimum charge $2.40. Repeat insertions with no change in copy—three insertions for the price of two. ¶ Display advertising in this section at published display advertising rates. ¶ Estimate 41 characters per line, counting all spaces and punctuation as one character each. Allow ten characters for box number for blind advertisements. If address given, counts same as advertising copy. ¶ Rates are net (no commission, no discount) and payable in advance of publication. Send your remittance with insertion order and copy. ¶ Closing date—15th of preceding month. Example—January issue closes December 15.

Address all box numbers c/o EXCAVATING engineer . . . . . at South Milwaukee, Wisconsin

TRUCK CRANES and SHOVELS

UNIVERSAL—24' boom crane—with distributor frame only. Waukesha 4-cylinder 4¾"x6" engine. Good operating condition. Located Milwaukee, Wisconsin. Box 2207-SCC

UNIVERSAL GAS TRUCK CRANE. Full revolving. 20' boom. ⅝-yard Kiesler clamshell bucket with teeth. 4-wheel Mack truck. 4-cylinder 4¾"x6½" engine. Good operating condition. Located Chicago. Box 2071-SCC.

UNIVERSAL—THEW Model AC-35, ½-yard gasoline truck crane. 28' beom. ½-yd. Owens digging bucket. Mack truck equipped with dual hard tires rear and pneumatic tires front. Condition good. Located Central New York State. Box 1193-SCC.

UNIVERSAL ½-yd. Shovel and 35' Boom Dragline. Waukesha Engine. Distributor frame for mounting on truck but not including truck. Thew caterpillar mounting available. Working condition. Located Illinois. Box 2233-SS.

SMALL SHOVELS
Under 2 Yards

⅜-YARD

BUCYRUS-ERIE 10-B Gas Shovel. 14" Cat Treads. Hercules Engine. Located North Carolina. Box 2220-SS.

BUCYRUS-ERIE 10-B Gas Shovel. Electric Starter. Hercules Engine. Very good condition. Located Eastern Pennsylvania. Box 2221-SS.

½-YARD

AUSTIN-WESTERN—½-yd. Shovel and Dragline. ½-yd. Page Drag bucket. Dragline equipment practically new. Very good condition. Located Wyoming. Box 2224-SS.

BAY CITY MODEL 30, gasoline combination ½-yard shovel and 35' boom dragline, ½-yd. Page drag bucket. Hercules 6-cylinder 4¼"x 4½" engine. Machine shop reconditioned. Available about 30 days. Located Milwaukee, Wis. Box 2202-SS.

BUCYRUS-ERIE 16-B Gas Chain Crowd Shovel. Waukesha 6-Cylinder 3¾"x4¾" engine. Good working condition. Located Conn. Box 2225-SS.

BUCYRUS-ERIE 16-B Gas Shovel, Dragline and Clamshell. ⅝-yd. Shovel dipper. 35' Clamshell—Dragline boom. Winch head. Electric starter. Waukesha 6-cylinder 4"x4¾" engine. Very good condition. Located North Carolina. Box 2226-SS.

P&H MODEL 150—½-yard shovel. Powered by Ford V-8 engine. Also has trench hoe attachment. Good operating condition. Located vicinity Boston. Box 2206-SS.

⅝-YARD

BUCYRUS-ERIE 19-B Gas. ⅝-yd. Positive Rope Crowd Shovel. Electric starter. Wisconsin Model L-4 6-cylinder engine. Located near Boston. Box 2227-SS.

BUCYRUS-ERIE TYPE AA ⅝-yard Air Tunnel shovel cat. mounted. Two speeds. Will work in 14' clearance. Reconditioned. Excellent condition. Located New York. Box 2180-SS

BYERS MODEL 128. ⅝-yd. gas shovel and 35' boom dragline, including ½-yd. Page "C" drag bucket. 4-cylinder Diamond T engine. Engine overhauled 1937. Good operating condition. Located Illinois. Box 2087-SS.

GENERAL—⅝-yd. Gas shovel. Cood condition. Located Eastern Pennsylvania. Box-2104-SS.

If You Do Not Find What You Want Listed—Write Us

EXCAVATING engineer
South Milwaukee, Wisconsin

¾-YARD

BUCYRUS-ERIE TYPE B Steam Shovel. ¾-yard Quarry dipper. Cat mounted. New boiler installed late 1935. Good operating condition. Located Georgia. Box 2073-SS.

BUCYRUS-ERIE — TYPE B, ¾-yard steam shovel and 40' boom clamshell. Cat. mounted. Located Buffalo, New York. Box 2005-SS.

P&H MODEL 400—Combination ¾-yard gasoline shovel and crane. Crane boom 35' plus 10' extension. Waukesha 4-cylinder 5"x6¼" engine. Located vicinity Boston. Box 2203-SS

⅞-YARD

BUCYRUS-ERIE B-2. Extra High Lift shovel. 21'3" boom. 18'4" dipper handle. ⅞-yard dipper. Well cared for. Good condition. Located Rhode Island. Box 2047-SS.

BUCYRUS-ERIE — 1035 GASOLINE SHOVEL. Chain Crowd. ⅞-yard Dipper. 26-in. caterpillar treads. Electric starter. Needs some repairs. Located vicinity Boston. Box 1065-SS.

BUCYRUS-ERIE — B-2 — HIGH LIFT STEAM shovel. 21'3" boom, 16' dipper handle, ⅞-yard dipper. Single shaft caterpillar. Located Vermont. Box 1135-SS.

1-YARD

BUCYRUS-ERIE 32-B—Gasoline chain crowd 1-yard shovel. Electric starter. Single shaft cats. Wisconsin 6-cylinder 5"x6" engine. Few minor repairs needed. Otherwise excellent condition. Located near Boston. Box 2061-SS.

BUCYRUS-ERIE — D-2 1 yard Diesel Shovel. Atlas engine. Field reconditioned. Located North Carolina. Box 1079-SS.

BUCYRUS-ERIE 1030 — ELECTRIC TUNNEL shovel. Boom 10 ft. 7 in. Dipper handle 10 ft. 5 in. 1-yd. dipper. Boom hoist 5 ft. 6 in. rear end clearance. 2 motor—power supply 3 phase, 60 cycle, 440 volt. Located Virginia. Box 1068-SS.

BUCYRUS-ERIE—31-B STEAM SHOVEL. 22' boom, 15' dipper handle, 1-yard dipper. Now operating, can be demonstrated. Located Alabama. Box 1130-SS.

MARION MODEL 7, 1-yard steam shovel. Has not operated in the past five years. New flues recently installed in boiler. Located Buffalo, New York. Box 2006-SS.

P&H MODEL 600 1-yd. Gasoline shovel. Waukesha engine. Crane equipment also available. Good condition. Located Connecticut. Box 2113-SS

1¼-YARD

BUCYRUS-ERIE 33-B—1¼-yard gas shovel—chain crowd. One year old. Located Northern Minnesota. Box 2213-SS

FOR SALE

Address all box numbers c/o EXCAVATING engineer . . . . . at South Milwaukee, Wisconsin

SMALL SHOVELS
Under 2 Yards continued

BUCYRUS-ERIE GA-2—Gas-Air Extra High Lift Shovel. Waukesha 4-cylinder 6¼"x8". engine. Factory rebuilt since originally shipped. Good operating condition. Located near Boston. Box 2228-SS.

BUCYRUS-ERIE GA-3 Gas-Air 1¼ yard shovel. Single shaft cat. Electric starter. Waukesha 4-cylinder 6¼"x8" engine. First class condition. Located near St. Louis. Box 2162-SS.

BUCYRUS-ERIE GA-3 Gas-Air 1¼-yd. shovel. Waukesha 4-cylinder 6¾"x8" engine. Good operating condition. Now operating Arizona. Box 2090-SS.

BUCYRUS-ERIE. GA-2, Gas-Air. 1¼-yard shovel. Electric starter. Waukesha W.L. 4-cylinder 6¼"x8" engine. Single shaft cat. Extensively repaired recently. Located Texas. Box 2030-SS.

2—BUCYRUS-ERIE E-2 shovels and draglines. 1½-yard Plate dipper. 45' boom plus 10' extension. 1¼-yard Page drag bucket. Electric light plant. Atlas Diesel engines. Engines overhauled since last used. Balance of machines good operating condition, except minor repairs needed. Located Louisiana. Box 2053-SS.

TWO—BUCYRUS-ERIE—GA-3, GAS-AIR 1¼-yard shovels. Wisconsin D-2—6 cyl. 5¼"x6½" engines. Good condition. St. Paul, Minnesota. Box 1097-SS.

BUCYRUS-ERIE 41-B — 1¼-YARD STEAM SHOVEL. Located near Boston. Electric light plant. Very good price. Box 1096-SS.

BUCYRUS-ERIE—41-B—STEAM SHOVEL. 21' boom, 15' dipper handle, 1¼-cubic yard dipper. Now operating. Will demonstrate. Located Alabama. Box 1131-SS.

BUCYRUS-ERIE GA-3—Gas-Air 1¼-yard high lift shovel and 45' boom clamshell machine. Electric starter. Single shaft cat. Waukesha 4-cylinder 6¼"x8" engine. Few minor repairs needed. Otherwise excellent condition. Located New Jersey. Box 2058-SS.

KOEHRING MODEL 501 1¼ yard gas shovel. Located New Mexico. Box 2148-SS.

LIMA MODEL 101. 1¼-yard gas shovel. 50' boom dragline. Excellent condition. Located Texas. Box 2029-SS.

3—LIMA MODEL 101. 1¼-yard gasoline shovels. 26' boom. 17' dipper handle. Waukesha Model J. K. 6½"x7" engine. Recently rebuilt. Excellent condition. Located Texas. Box 2042-SS.

2 MARION Model 450—Steam Shovels. Good condition. Located Connecticut. Box 1154-SS.

MARION MODEL 32—1¼-yd. steam shovel. Boiler inspected February 1, 1938. Machine in good condition. Located Eastern Pennsylvania. Box 2101-SS.

OSGOOD. 1¼-yard gasoline shovel. 1-yard dipper also available. 4-cylinder Larol gas engine. Only operated three months since $2,000 repairs applied. Excellent condition. Located Texas. Box 2043-SS.

1½-YARD

BUCYRUS-ERIE 37-B—Diesel 1½-yd. Chain Crowd Shovel. Atlas Engine. Considered to be in excellent condition. Located Connecticut. Box 2229-SS.

P&H MODEL 700-B. 1½-yd. Gasoline shovel. Waukesha engine. Good condition. Located Connecticut. Box 2114-SS.

1¾-YARD

BUCYRUS-ERIE 43-B late model 1¾-yd. chain crowd shovel. Electric starter. 1½ K.W. Kohler light plant. Buda-Lanova 6-cylinder 5¼"x7" Diesel engine. Located Central New York State. Excellent condition. Box 2019-SS.

BUCYRUS-ERIE 43-B Diesel Shovel. 22' Boom. 17' Dipper Handle. 1¾-yd. dipper. Chain crowd. Buda-Lanova 6-cylinder 5¼"x7" engine. Electric starter. Located Connecticut. Box 2231-SS.

MARION—MODEL 480 High Lift Steam Shovel. Very good condition. Ready to go to work. Located Minnesota. Box 2215-SS

5—MARION MODEL 37, 1¾-yard steam shovels, steel cab. Good working condition. Located Minnesota. Box 2153-SS.

2-YARD

MARION MODEL 480—2-yd. Steam shovel. Vertical boiler. Boiler inspected February 1, 1938. Excellent condition. Located Eastern Pennsylvania. Box 2102-SS.

NORTHWEST—MODEL 80—2-yard gas shovel. Twin City 8"x9" engine. Actually used about 20 months. Since fully repaired except dipper. Excellent condition. Located State of Washington. Box 2214-SS

If You Do Not Find What You Want Listed—Write Us
EXCAVATING engineer
South Milwaukee, Wis.

SMALL DRAGLINES
Under 2 Yards

⅜-YARD

BUCYRUS-ERIE 10-B ⅜-yard gasoline, 28' boom dragline, including ⅜-yard drag bucket. Located Texas. Box 2212-SD

BUCYRUS-ERIE 10-B Gas Dragline, 28' Boom. ⅜-yd. AU Drag bucket. Battery lights and electric starter. 14" cat treads. Field reconditioned. Located Texas. Box 2219-SD.

½-YARD

AUSTIN-WESTERN — ½-Yd. dragline and shovel. ½-Yd. Page drag bucket. Dragline equipment practically new. Very good condition. Located Wyoming. Box 2224-SD.

BAY CITY MODEL 30, gasoline combination 35' boom dragline and ½-yd. Page drag bucket and ½-yd. shovel. Hercules 6-cylinder 4¼"x 4½" engine. Machine shop reconditioned. Available about 30 days. Located Milwaukee, Wis. Box 2202-SD.

BUCYRUS-ERIE 16-B Gas dragline, clamshell and shovel. 35' Dragline—Clamshell boom. ⅝-Yd. shovel dipper. Winch head. Electric starter. Waukesha 6-cylinder 4"x4¾" engine. Very good condition. Located North Carolina. Box 2226-SD.

UNIVERSAL—Gas ½-yd. Shovel and 35' Boom Dragline on Thew Style caterpillar mounting. Distributor frame for truck mounting also included. Fair working condition. Located near Chicago. Box 2233-SD.

⅝-YARD

BYERS MODEL 128. ⅝-yd. Gas dragline 35' boom including ½-yd. Page "C" drag bucket. 4-cylinder Diamond T engine. Engine overhauled 1937. Good operating condition. Located Illinois. Box 2087-SD.

NORTHWEST MODEL 2, 40' boom dragline—Page ⅝-yard R. C. dragbucket. Kohler light plant. Wisconsin 4-cylinder 5¼"x6½" engine. Very good operating condition. Located Illinois. Box 2209-SD.

¾-YARD

AUSTIN MODEL "MA"—Gasoline Dragline—37' Boom—¾ yd. Page "M" drag bucket. Good operating condition. Located western Nebraska. Box 2198-SD.

NORTHWEST MODEL 105 GAS—40' boom dragline and clamshell, including Page "C" drag bucket. Climax engine. Reasonably good operating condition. Located Atlanta, Ga. Box 995-SD.

⅞-YARD

BUCYRUS-ERIE 1035 Gasoline 40' boom dragline and clamshell, including 1-yd. dragline and clamshell buckets. 26" cat. treads. Waukesha engine. Recently overhauled. Located Colorado. Box 2177-SD

1-YARD

BUCYRUS-ERIE 30-B Diesel 40' boom dragline. Atlas Diesel 3-cylinder 8½"x10½" engine. $1,500 repairs recently applied. Excellent condition. Located near Chicago. Box 2132-SD

BUCYRUS-ERIE 32-B Gas 50' boom dragline and 1-yd. "U" Drag bucket. Electric starter. Wisconsin engine. Good operating condition. Located Eastern Pennsylvania. Box 2088-SD.

BUCYRUS-ERIE — D-2 — DIESEL DRAGLINE. Atlas engine. Located Texas. 40' Boom. 1¼ yd. Page Bucket. Field reconditioned. Excellent mechanical and operating condition. Box 1020-SD.

1¼-YARD

BUCYRUS-ERIE GA-2, Gas-Air 45' boom dragline. Electric starter. Battery lighting system. Waukesha 4-cylinder 6¼"x8" engine. Operating condition. Located Minneapolis, Minn. Box 2210-SD

BUCYRUS-ERIE E-2 Diesel 45' boom dragline and 1¼-yard Page bucket. Fair working condition. Located Kansas. Box 2178-SD

BUCYRUS-ERIE E-2 dragline and shovel. 45' boom plus 10' extension. 1¼-yard Page drag bucket. 1½-yard plate dipper. Electric light plant. Atlas Diesel engine. Engine overhauled since last used. Balance of machine good operating condition, except minor repairs needed. Located Louisiana. Box 2053-SD.

LIMA MODEL 101, 1¼-yd. gas 50' boom dragline and shovel. Excellent condition. Located Texas. Box 2029-SD

P & H—MODEL 210—55' boom dragline including 1¼-yard Page bucket. Gas powered. Located South Dakota. Box 1172-SD

1½-YARD

LINK-BELT K-44 Dragline. 44' Boom plus 8' Extension—53'. 1½-yd. Omaha bucket. Waukesha 4-cylinder 6¾"x8" engine. Located Northwestern Missouri. Box 2230-SD.

NORTHWEST MODEL 6 dragline. Boom 50' plus 10' extension. 1⅝-yard Page R. C. dragbucket. Kohler light plant. Murphy Diesel engine. Approximately 1 year old. Excellent condition. Located Illinois. Box 2208-SD.

FOR SALE

Address all box numbers c/o EXCAVATING engineer . . . . . at South Milwaukee, Wisconsin

SMALL CLAMSHELLS AND CRANES
Under 2 Yards

⅜-YARD

BAY CITY—⅜-YARD GAS CLAMSHELL. Also drag shovel equipment. Located near Boston. Box 1084-SCC

½-YARD

BUCYRUS-ERIE 16-B Gas clamshell, dragline and shovel. 35' clamshell—dragline boom. Winch head. ⅝-Yd. shovel dipper. Electric starter. Waukesha 6-cylinder 4"x4¾" engine. Very good condition. Located North Carolina. Box 2226-SCC.

P&H MODEL 300—Gas ½-yd. Clamshell. 35' Boom. Also Trench Hoe Equipment. Located near Chicago. Box 2223-SCC.

⅝-YARD

P & H MODEL 204. 35' boom gasoline clamshell. ⅝-yard Kiesler clamshell bucket. Waukesha engine. New cab. Generally very good condition. Located Chicago. Box 2036-SCC.

¾-YARD

BUCYRUS-ERIE—TYPE B, ¾-yard, 40' boom steam clamshell and shovel. Cat. mounted. Located Buffalo, New York. Box 2005-SCC.

NORTHWEST MODEL 105 GAS — 40' boom clamshell and dragline, including Page "C" drag bucket. Climax engine. Completely reconditioned. Located Atlanta, Ga. Box 995-SCC.

P&H MODEL 400—Combination gasoline crane and ¾-yard shovel. Crane boom 35' plus 10' extension. Waukesha 4-cylinder 5"x6¼" engine. Located vicinity Boston. Box 2203-SCC

⅞-YARD

BUCYRUS-ERIE 1035 Gasoline 40' boom clamshell and dragline including 1-yd. clamshell and dragline buckets. 26" cat. treads. Waukesha engine. Recently overhauled. Located Colorado. Box 2177-SCC

1-YARD

BUCYRUS-ERIE — GA-2 — GAS-AIR 45' Boom Clamshell Machine Good Operating Condition. Located St. Paul, Minn. Box 1024-SCC.

BUCYRUS-ERIE — GA-2 GAS AIR Clamshell. 45' boom. Single Shaft Caterpillar. Waukesha 4 cylinder 6¼"x8" engine. Rebuilt since original manufacture. Good operating condition. Located New Jersey. Box 1104-SCC.

NORTHWEST MODEL 105—45' boom gas crane. Good operating condition. Located vicinity Duluth, Minnesota. Box 2204-SCC

P&H MODEL 600, 1-yd. gasoline shovel. Crane equipment also available. Waukesha engine. Good condition. Located Connecticut. Box 2113-SCC

1¼-YARD

BUCYRUS-ERIE GA-3 — Gas-Air 1¼-yd. 45' boom clamshell and high lift shovel. Electric starter. Single shaft cat. Waukesha 4-cylinder 6¼"x8" engine. Few minor repairs needed. Otherwise excellent condition. Located New Jersey. Box 2058-SCC.

LINK-BELT, MODEL K-2. Gas crane. 50' boom. Also 2 extra 20' inserts to make 90'. Weight 67,000 lbs. Located St. Paul, Minn. Box 2013-SCC.

LARGE SHOVELS AND DRAGLINES
2 Yards and Over

BUCYRUS-ERIE 50-B, 2-yd. steam shovel. Good operating condition. Located Central New York State. Box 2020-LSD.

BUCYRUS-ERIE 50-B steam high lift shovel and 60' boom dragline. Electric light plant. Good operating condition. Located Eastern Pennsylvania. Box 2188-LSD.

BUCYRUS-ERIE 50-B Diesel Dragline Kohler Light Plant. Used only 4 years. Good condition. Located Illinois. Box 2083-LSD.

BUCYRUS-ERIE — 52-B — DIESEL 2¼ yard Shovel and Dragline. Atlas engine. Good condition. Located Eastern Pa. Box 1039-LSD.

BUCYRUS-ERIE 55-B—Extra High Lift Diesel Shovel. 35-ft. boom, 22-ft. dipper handle, 2 cu. yd. Bowl Door dipper. Caterpillar mounted. Kohler light plant. Atlas Diesel engine. Used about three months. Just like new. Located Eastern Pennsylvania. Box 1069-LSD.

70-C BUCYRUS STEAM SHOVEL on Cats. Complete. In operating condition. Shop number 1712. Also one extra three-yard Manganese dipper and sticks. Chicago territory. Box 2164-LSD.

BUCYRUS-ERIE—CLASS 24 DIESEL dragline. 130-ft. boom, 4 cu. yd. bucket. Truck mounted. 165 h.p. Anderson Diesel engine. Friction drive. Said to be in good operating condition. Located on Mississippi River near New Orleans convenient for loading on barge. Box 1074-LSD.

ANY FAIR OFFER ACCEPTED

Class 24 steam dragline. 100 foot boom, 5 cubic yard buckets. Skid and roller mounted. Rebuilt 1927 at a cost of $15,000. New locomotive boiler installed 1928. Will accept any fair offer. Located near Fort Worth, Texas. Box 2149-LSD.

If You Do Not Find What You Want Listed—Write Us

EXCAVATING engineer
South Milwaukee, Wis.

BUCYRUS-ERIE 95-C. 3-yard steam shovel. Cats. installed 1925. Fair condition. Located Kansas. Box 2050-LSD.

BUCYRUS-ERIE — 100-B — STEAM SHOVEL. 3 yard Dipper. Machinery very good condition. Located Montreal, Canada. Box 1041-LSD.

BUCYRUS-ERIE 100-C. 3-yard steam shovel. Cat. mounted. Fair condition. Located Kansas. Box 2049-LSD.

BUCYRUS-ERIE 175-B 2 Motor AC Electric Dragline. Truck Mounted. 125' boom. 1 each 4-, 5-, and 6-yd. drag buckets. Chain drive from main motor to intermediate shaft. Extra rotors for main and swing motors and other spare parts. 3—75 KVA 60 cycle 2200/220/440 volt transformer mounted on machine. Power supply 3 phase 60 cycle 440 volt. Completely overhauled since received from factory. First class operating condition. Located Kansas. Box 2082-LSD.

CLASS 230 STEAM DRAGLINE. 175-foot steel and aluminum boom. 6-yard RED ARCH bucket. Ready to work. Located near New Roads, Louisiana. Box 2152-LSD.

COAL MINE SHOVELS

MARION MODEL 250 STEAM SHOVEL (less dipper handles) with 3 cu. yd. dipper. Also Sullivan 9x12x10 air compressor and receiver.

BUCYRUS 27-D STEAM horizontal thrust coal loader 1½ cu. yd. capacity.

BUCYRUS 225-B ELECTRIC SHOVEL, Ward--Leonard control, with Model 320-B electric machinery. 80' boom, 52' handles. 8 cu. yd. dipper.

All in first class serviceable condition. Available for immediate dismantling. Located near Ft. Smith, Arkansas. Box 2194-LSD.

CLASS 320 STEAM DRAGLINE, 144-foot boom. 8-yard bucket. Located on Illinois River. A good buy. Box 2155-LSD.

BUCYRUS-ERIE — TOWER EXCAVATOR. 130' head tower. 50' tail tower. 12-yard bottomless bucket. Electrical equipment 3 phase 60 cycle 4000 volts Ward Leonard. WILL RENT. Located Louisiana. Box 2069-LSD.

BUCYRUS-MONIGHAN 1½-T Diesel dragline. 60' boom. Located Kansas. Box 2168-LSD

BUCYRUS-MONIGHAN 2-T Diesel Dragline. 70' boom. Located Kansas. Box 2169-LSD

BUCYRUS-MONIGHAN 2-W Diesel dragline. 70' boom. Located Louisiana. Box 2170-LSD

BUCYRUS-MONIGHAN 3-T Diesel dragline. 77' boom. Located Louisiana. Box 2171-LSD

BUCYRUS-MONIGHAN 3-T DIESEL dragline. Working Arkansas. Box 1056-LSD

BUCYRUS-MONIGHAN Model 3½-T—70' boom dragline. 2½-yard dragbucket. Fairbanks Morse Diesel engine. Located North Dakota. Box 2206-LSD

BUCYRUS-MONIGHAN 4-W Walking dragline, 80' boom 5½ yard Page bucket, 30' boom insert and 4-yard bucket. Located Tennessee. Box 2150-LSD.

BUCYRUS-MONIGHAN 4-W Diesel Dragline. 110' Boom. 4½-yd. Bucket. Reported good working condition. Located Georgia. Box 2232-LSD.

BUCYRUS-MONIGHAN 5-W Diesel Dragline. 90' Boom. Electric swing. Vortex Air Oil Cleaners. Electric fan in operators platform. 5-yd. "Y" drag bucket. Fairbanks Morse 250 HP Type 38-D 5-cylinder 10"x10½" pump scavenging engine. Auxiliary Waukesha gas engine. Good working condition. Located Colorado River Aqueduct near Indio, Cal. Box 2079-LSD.

BUCYRUS-MONIGHAN MODEL 6160 — Diesel Dragline. 160' boom. 6-yard drag bucket. Fairbanks-Morse Diesel engine. $15,000 extras added since machine was recently purchased. Will rent. Located Montana. Box 2068-LSD.

MARION MODEL 60. 2½-yard steam shovel on railroad trucks. Good appearance and condition. Located Kansas. Box 2051-LSD.

MARION — MODEL 70-E — 3½ yard Electric Shovel. Railway truck mounted. Power Equipment. 3 Phase. 60 cycle, 2300 volt. Good condition. Located Ohio. Box 1050-LSD.

MARION—MODEL 350—8 yard Electric Shovel. Power equipment, 3 Phase, 60 cycle, 2300 volt — Ward-Leonard Control. Mounted on railway trucks. Good condition. Located Minnesota. Box 1049-LSD.

PAGE—MODEL 220—2½ yard Diesel Dragline. 85' Boom. Good operating condition. Located Iowa. Now operating. Box 1052-LSD.

PAGE — MODEL 220 — Electric dragline. 90' boom, 3½-yard Page R.C. drag bucket. Box 1124-LSD.

P&H MODEL 900, 3½ yard Diesel Shovel, 33-foot boom, 200 h.p. Fairbanks-Morse engine. Mounted on caterpillars. Box 2151-LSD.

FOR SALE

Address all box numbers c/o EXCAVATING engineer . . . . . at South Milwaukee, Wisconsin

LOCOMOTIVES

STANDARD GAUGE LOCOMOTIVES BARGAINS

2—Baldwin 77-ton 19x26
4—Baldwin 51-ton 17x24
1—American 60-ton 20x26
Located in Minnesota.
Box 2147-ME.

MISCELLANEOUS EQUIPMENT

For Sale, reasonable: All located Cleveland, Ohio.
1—Austin Trencher Model 42-15..$1000 F.O.B.
1—Buckeye Trencher Model 201....$1300 F.O.B.
1—Twin City Engine 75 h.p., 7¾"x9" .....$ 250 F.O.B.
1—Goose-neck Trench Hoe boom for P&H 600, slightly used....$ 800 F.O.B.
Box 2211-ME

FOR SALE

Front-end equipment of 50-B W. L. Electric Horizontal Crowd 2 cu. yd. Coal-Loader. In good mechanical condition. Located Kansas. Box 2217-ME.

AMSCO—2½-Yard Manganese Steel, heavy-duty, rock type dragline bucket, including all necessary chains and 11 teeth. Located Minnesota. Box 2216-ME

1—20-TON ALL STEEL GUY DERRICK, 80' mast. 75' boom complete with 6 Guy cables approximately 250' long. Includes Dake steam engine driven winch bolted on side of mast complete with load and cables. Also electric motor in addition to Dake engine. Hand swing. Also included one Westinghouse cross-compound steam driven air compressor. Approximate weight 20,000 lbs. Located Wisconsin. Box 2156-ME.

BROWNHOIST 50' boom steam locomotive crane. Standard gauge car wheel mounted. Overhauled 1937. Located vicinity Chicago. Box 2136-ME

AUSTIN MODEL 42-15 DITCHER. Twin City Gas Engine. 4-Cylinder 7¼"x9". Will cut 22" minimum to 42" maximum width to approximately 20' depth. Has seen comparatively little service and few repairs needed. Completely overhauled before last job. Will demonstrate on notice. Located North Carolina. Box 2222-ME.

BROWNHOIST 40' boom steam locomotive crane. Standard gauge car wheel mounting. Fair condition. Located vicinity Chicago. Box 2135-ME

LOCOMOTIVE CRANES

4—Standard gauge locomotive cranes, three—20-ton, one—10-ton. Offered at bargain prices. Located Minnesota. Box 2146-ME.

COAL MINE EQUIPMENT

PRICED TO SELL. The following equipment located a short distance from Ft. Smith, Arkansas may be had at bargain prices for immediate delivery.
No. 3 Centrifugal pump with 10 h.p. motor.
4" Centrifugal pump.
8" Centrifugal pump, direct connected with 50 h.p. motor.
3" Centrifugal pump with 7½ h.p. motor.
I-R compressor with motor and receiver mounted on wagon.
3—I-R paving breakers.
Wood tipple to include 36" drag conveyor with 20 h.p. motor and switch on Conveyor, 15 h.p. motor and switch on conveyor,
15 h.p. motor & switches on shaker,
5 h.p. motor & switches on lump boom,
5 h.p. motor & switches on egg boom,
3 h.p. motor & switch on lump boom hoist.
2—10 KVA transformers.
50 tons good No. 60 relaying steel with six No. 8 turn-outs.
For full particulars, write Box 2193-ME.

FRUEHOFF SEMI-TRAILER with 8' by 40' Deck. (Can be shortened.) Single rear axle with 4 wheels each with 36"x10" solid rubber tires. Air Brakes. 16 ton capacity. Excellent condition. Located New York. Box 1160-ME.

DRAG BUCKET

1½-YARD Type "Y" Bucyrus-Erie Drag Bucket. Good condition. Located Kansas. Box 1166-ME.

DRAGLINE EQUIPMENT

72-ft. Dragline Boom and Fairlead (suitable Bucyrus-Erie 75-B)—Hydraulic Equipment—1 Hoist Drum—1 Drag Drum—1 Boom Suspension, Sway Brace and Suspension Cables. Located Eastern Pennsylvania. Box 1060-ME

CAR TRANSPORTER

CAR-TRANSPORTER or stacker with reach of 135' and dumping height of 75'. Equipped with 4-yard aluminum car. Caterpillar-mounted and suitable for use with shovel having per hour output of 250 yards. Electric drive, 3-phase, 60-cycle, 4000-volt current. This car transporter is in excellent condition and priced to sell. Located near Kansas City, Missouri. Box 2010-ME.

SHOVEL EQUIPMENT—For Bucyrus-Erie 52-B Diesel. Handled only about 4,000 yards material. Equipment located Alabama. Box 1113-ME

FRONT FOR 32 MARION

1½ CU. YD. shovel front end—new dipper—for Marion 32 steamer. Priced right. Located near Chicago. Box 2165-ME.

TWO WESTINGHOUSE steam-driven, single stage, locomotive type Air Compressors. 11" air cylinder, 11" steam cylinder, 12" stroke. Includes governor, gauges, etc. Never been used. Bargain price. Located Pennsylvania. Box 2201-ME

ONE METALWELD, 2-cylinder, 7"x6" vertical Air Compressor, 162 cu. ft. capacity—with subframe and extended shaft with half-coupling. Includes water pump, 18"x41" Metalweld air tank, gauges, etc. Located Pennsylvania. Box 2200-ME

KOEHRING DRAG SHOVEL equipment for Model 301 machine. Used very little. Low price. Located Eastern New York State. Box 1151-ME

USED CONTRACTORS EQUIPMENT

1—Model 100 Lincoln Revolver with 100' boom and 12' Gantry.
2—275 Koehring Mixers with Electric motors.
1—200-ton Blaw-Knox Bin with weighing batchers, cement scale and push button control.
1—Robinson Pneumatic cement unloader with silo.
1—20-ton Whitcomb Gasoline Dinkey, overhauled.
4—18-ton Steam Dinkeys, overhauled.
12—30-yd. Western Lift Door Air Dump cars.
4—30-yd. Koppel Drop Door Air Dump cars.
26—16-yd. K. & J. Lift Door Air Dump cars.
6—20-yd. K. & J. Lift Door Air Dump cars.
5—2-cu. yd. Blaw-Knox Roller gate Concrete Buckets.
7—70-ton 20x36 Baldwin Switchers.
3—Jordan spreaders excellent condition.
Located Mississippi valley. Box 2011-ME.

DRAG SHOVEL EQUIPMENT—For Bucyrus-Erie 1020 shovel. Located Rhode Island. Box 2003-ME

SURPLUS MINE EQUIPMENT BARGAIN PRICES

Write for prices of this equipment. Save money. Located in Minnesota.
5—Boilers, locomotive and horizontal return tube types, 150 H.P.
14—Flat cars, 36" gauge, 18-ton.
1—Carroll crusher, jaw, 44x28.
1—Motor, 135 H.P. squirrel cage, 1150 r.p.m., 220 v., 3 ph., 60 cy., A. C.; compensator.
3—Rotary converters, 300 Kw., HCC-6-300-1200, Forms P, D, & V, 6 and 3 phase.
1—Switchgear for 3-phase rotary converter, complete, semi-automatic.
3—Transformers, 300 Kw., 66,000 V. Primary, reconnected for 22,000 V. Primary.
1—Ainley placer gold machine, complete. 4-bowl with feed hopper for dragline operation. 40-50 tons per hour.
1—Hoist, double drum.
1—Bucket loader.
8—Pumps, steam (1 gas engine driven) from 49 to 3700 g.p.m.
1—Tractor, Twin City No. 12-20.
1—Water softener, 5 ft., complete.
2—Drums mine hoist, dia. 50", width 40", flange 7", capacity 400' one-inch rope.
Box 2145-ME.

BLAST-HOLE DRILLS

14—Sanderson-Cyclone Model 14, non-traction—six Model 14-SR, traction type, electric blast-hole drills. Also six Loomis Clippers—Models 4 and 44, steam traction. All in good condition, available for immediate shipment. Located New York. Priced to sell. Box 2167-ME.

WANTED

WANTED: Scraper, 2-wheel, 3½-yard Bucyrus-Erie or similar, in good condition. State location, price and enclose photograph. Box 2218-ME.

WILL BUY heavy-duty trailer that can carry about 35 tons. State condition, price and location. Box 2234-ME.

WANTED: 50' to 60' boom and extra drum for crane work, for Marion Steam Crane, Model 32. Box 2236-ME.

SPECIAL NOTICE! ROCK BOTTOM PRICES! *(for immediate acceptance only)*

MINERS—CONTRACTORS—EARTH HANDLERS—ETC.

6½-yd. **SHOVEL,** Bucyrus 320-B; electric $12,500
2-yd. **DRAGLINE,** Monighan; steam..... 1,000
25-ton **LOCO. CRANE,** 60-ft boom; steam..... 2,250
40-ton **WRECKING CRANE,** RR type, steam, 4'8½" ga. 2,000
5-ton **ORE BUCKET,** Hulett 300
2, 1½-yd. **CLAM BUCKETS;** Brownhoist ....ea. 150
20, 40-ton **STEEL DOUBLE HOPPER CARS,** 4'8½" ga. ....ea. 300
16, 20-yd. **AIR DUMP CARS,** Magor; 4'8½" ga. ....ea. 900
4, 20-yd. **AIR DUMP CARS,** Koppel, 1'8½" ga. ....ea. 1,500
73, 12-yd. **AIR DUMP CARS,** Western 4'8½" ga. ....ea. 225
2, 10-ton 8-yd. **HAND DUMP CARS,** saddle back; 36" ga. ....ea. 155
36, 3-ton 7-yd. **HAND DUMP CARS,** Western, 36" ga. ....ea. 95
3, 100-ton **LOCOMOTIVES,** 0-8-0, steam; 4'8½" ga. ....ea. 4,950
HOIST: 2-sten drum, 5x7, 285' lift with 200 HP, 3-60-2300 motor 2,990
HOIST: 4x5 drum, 375' lift steam but also available a 100 HP 3-60-2300 new motor, complete but never connected .....$ 2,475
PUMPS: Rees RoTurbo Manistee centrifugal; 4-stage, type B2, all with 3-60-2200 motors:
1, 1000 gal. 350' head, 125 HP motor.....$ 1,000
1, 1000 gal. 300' head, 100 HP motor..... 850
1, 800 gal. 350' head, 100 HP motor..... 800
1, 700 gal. 200' head, 2-stage, 82, 50 HP motor 600
1, 10" **AMSCO MANGANESE PUMP,** puller dr. 345
COMPRESSOR: 700 cfm. I-R Imperial type 10; steam 750
CRUSHERS: Gyratory, Allis-Chalmers, Gates 4-K 440
Williams Hammermill 18"x16" 250
TUBE MILL: 5'x22', Allis-Chalmers, chilled iron lining 900
RELAYING RAILS: All std. sections ..... $25 up
PIPE: Cast Iron 16, 24"x12'; 7, 48"x12'; 3, 48"x8' .....

BUY NOW BEFORE PRICES JUMP

IRON & STEEL PRODUCTS, Inc.
13474 S. Brainard Ave. Chicago, Ill.

"Anything containing IRON or STEEL"